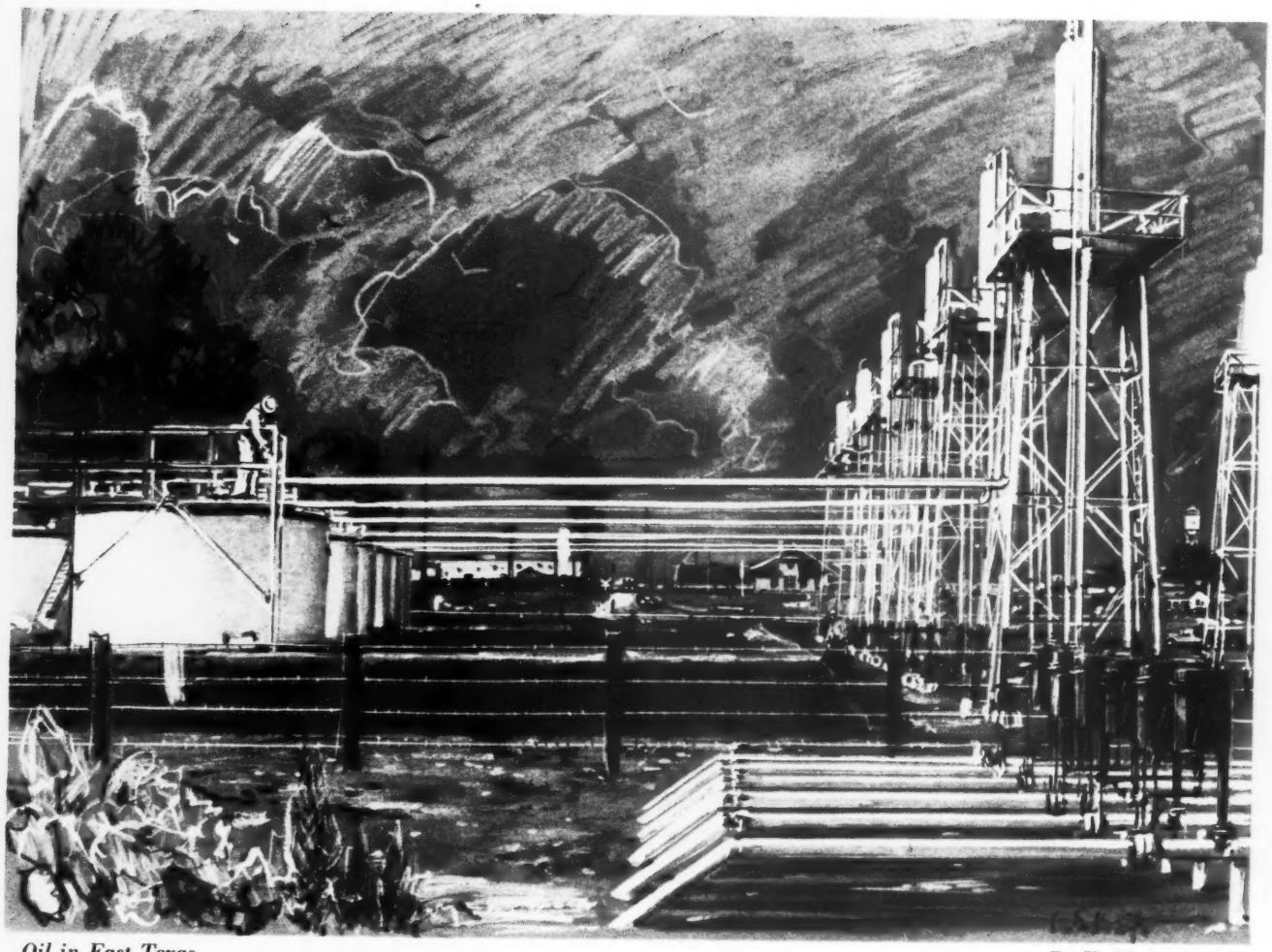
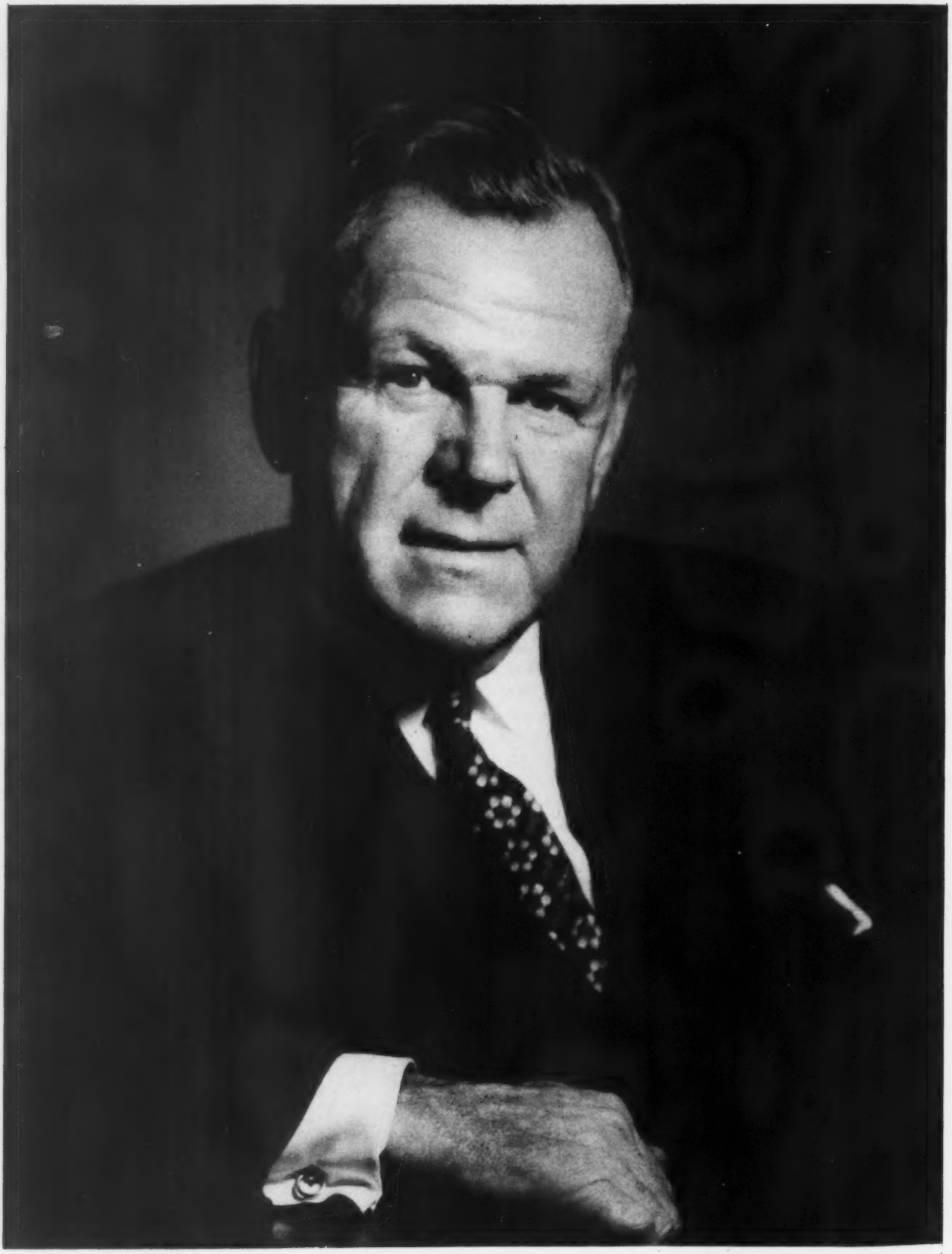


Oil in East Texas

By E. M. Schiwetz

The HUMBLE WAY

SEPTEMBER-OCTOBER, 1948



HARRY CAROTHERS WIESS: 1887-1948

Vice President, 1917-1933
Executive Vice President, 1933-1937
President, 1937-1948
Chairman of the Board, May 10 - August 26, 1948

The HUMBLE WAY

Vol. IV SEPTEMBER-OCTOBER 1948 No. 3

HARRY C. WIESS

A Resolution Adopted by the Board of Directors:

On August 26, 1948, death came to Harry Carothers Wiess, Chairman of the Board of Directors of Humble Oil & Refining Company.

The influence of Harry C. Wiess upon the welfare and the destiny of the Company was profound. He devoted his life to its welfare, giving of his physical, mental, and spiritual resources with almost complete abandon. Possessed of a keen and imaginative mind, he was able to appraise trends and see the turn of events so that when great occasions were at hand, his decisions were wise and sound. His insistence upon high standards of thinking, conduct, and performance stimulated others to attain similar high standards and thus gave character to both employees and the Company. He was dynamic, forceful, and aggressive; and his capacity for forthright action and his courage in following his convictions inspired confidence and lifted the whole effort of the organization. In all his actions he retained a highly conscientious sense of justice and fairness.

Initiative, energy, aggressiveness, and integrity characterized his career. He was among those who conceived the organization of the Company in 1917, assisted in such organization, and was Vice President from 1917 to 1933, directly responsible for refining and sales operations. He was Executive Vice President from 1933 to 1937, and President from 1937 until May, 1948, assuming the broad managerial responsibilities which go with executive leadership. He was Chairman of the Board from May, 1948, until his death.

In time of war, his contribution was equally as significant as it was in peace. Under his leadership the Company's production of war products reached record levels and was a material and outstanding contribution to victory. As a member of industry and governmental committees, boards, and councils, his patriotic impulses and vast knowledge and experience were made available to his country in the solution of important problems.

He participated actively in worthwhile national, state, and local efforts and gave generously of his time, intellect, means, and spirit to educational, religious, charitable, and civic causes.

In recognition of the profound influence he exercised over the organization and destiny of the Company, of his qualities of character and leadership, and of his charity, and as an expression of personal appreciation by all its members, the Board resolves that this resolution shall be spread upon its Minutes this the first day of October, 1948, and a copy be sent to his family.

FROM HIS OFFICE on the fourteenth floor of the Humble building, Mr. Wiess carried on his work. Here he met his associates and the many people with whom he worked in the oil industry, in the field of education, and in the affairs of his community, his state, and his country.

A CAREER IN OIL

THE life of Harry C. Wiess closely paralleled the development of the modern oil industry. He was born in Beaumont in 1887 and fourteen years later he saw the wild well at Spindletop which told the world that oil was present in the earth in quantities that had never been realized before. He lived to see America produce and use five and a half million barrels of oil every day and during the nearly half a century between Spindletop and his death, Harry Wiess had an important part in the development of an industry that, perhaps more than any other, has formed the basic pattern of American life.

He was the son of Captain William Wiess, a pioneer Texas industrialist who soon added oil to the list of other activities in which he was engaged. Upon graduation from Princeton University in 1909 with a degree in civil engineering, Harry Wiess went actively into the oil business. He worked in various capacities with the Paraffine and the Reliance Oil Companies, which were engaged in producing oil in the Texas and Louisiana Gulf Coast areas and in Oklahoma, and within a few years became president of both companies.

During this time, Mr. Wiess came to know and to have varied associations with some other pioneers in the oil industry with whom, a few years later, he was to organize the Humble Company. Among these men were W. S. Farish, R. L. Blaffer, R. S. Sterling and others who were active in the oil business at the time. The common interest of these oil producers in securing a dependable market and a satisfactory realization for their oil was the motivating factor which led them in 1917 to organize Humble Oil & Refining Company.

Mr. Wiess, then 32, was the youngest member of the founding group. Even so, his experience and ability were invaluable assets because he had lived close to the early development of the oil industry and already had important first hand experience with the problems it posed and with the operating techniques of that day.

He assumed responsibility for the new company's manufacturing program and for its sales operations. Among his first duties, he took charge of the construction of the projected refinery at Baytown. This would have been a challenging undertaking even for a man of experience in oil refining with a fine corps of capable, trained people to carry out the work. Over the short period of two years, by prodigious and persistent efforts, Mr. Wiess succeeded in building an organization, chiefly by developing talent within his own personnel. Within a year or two more the refinery began to turn out satisfactory products and to operate profitably. The great Baytown refinery, larger than any other in the United States, stands today as a monument to H. C. Wiess, for it has been developed either during his 14 years as vice-president for manufacturing or during his subsequent 15 years as executive vice-president and president of the company.

He believed from the beginning that the basis of oil refining was scientific and technical, and early in Baytown's development he brought to bear the best available knowledge of chemistry, physics, and engineering. Science was applied both to the development of processes and to the design and utilization

of equipment, and many of today's most effective phases of Humble's refining operations have their foundations in this early work. As an outgrowth of these technical efforts in refining, Mr. Wiess directed the organization of a production research group which became the forerunner of the vast development in this field which makes possible the production today of the almost astronomical quantities of oil that the world requires.

During the late twenties the Humble Company first entered the domestic marketing field in a serious way, and Mr. Wiess, as vice-president for marketing, had charge of that expansion. Under his direction most of the marketing facilities now in operation were acquired and built and the broad basic policies established under which the Sales department has continued to operate.

In 1933, Humble's president, W. S. Farish, resigned to take the chairmanship of the board of the Standard Oil Company (NJ), and at that time Mr. Wiess assumed the newly created position of executive vice-president. His responsibilities in the field of general management were greatly expanded, and in 1937 he became president of the company.

The years since then saw the preparation for, and the carrying out of the program to supply oil products for war on a scale not hitherto conceived. It was during the last decade of his life that the true impact of this man's contribution to the advancement of the oil industry came to full fruition. From the demands of war, the oil industry has turned to supply the even greater oil needs of the present, a demand that is still rising. That the industry is able to meet these demands for oil and that Humble is able to make such a substantial contribution is due in an important measure to the life and work of Harry C. Wiess.

In addition to his business interests and the close attention he devoted to them, Mr. Wiess also gave a full measure of time and effective effort to oil industry affairs and to civic and educational matters. His philanthropies and charities, although for the most part unheralded and unpublicized, were widespread and generous. He was, and had been for many years, a director of the American Petroleum Institute. During the war he served as a member of the Petroleum Industry War Council and in important posts of the Petroleum Administration for War. His interest in the field of education was expressed in terms of great personal service as well as financial support. He was vice-chairman of the board of trustees of The Rice Institute, a member of the Corporation of the Massachusetts Institute of Technology and a charter trustee of Princeton University.

PERHAPS ONE of the proudest days of his life was December 14, 1944, when the great Baytown refinery climaxed its magnificent war record by marking the production of the billionth gallon of one-hundred octane gasoline. With Mr. Wiess are: Rear Admiral William W. Smith, Bruce K. Brown, Deputy Petroleum Administrator of the P.A.W., and Major General Hubert R. Harmon.

WHEN EUGENE HOLMAN, president of Jersey Standard, and several of his associates visited Houston in June of this year, Mr. Wiess assembled a group of his Houston friends to greet them. Here are, left to right, Mr. Holman; former Governor R. S. Sterling, Humble's first president: S. P. Farish, with Humble himself in its early days and brother of the late W. S. Farish, former Humble president; and Mr. Wiess. This picture was taken just two months before his death.

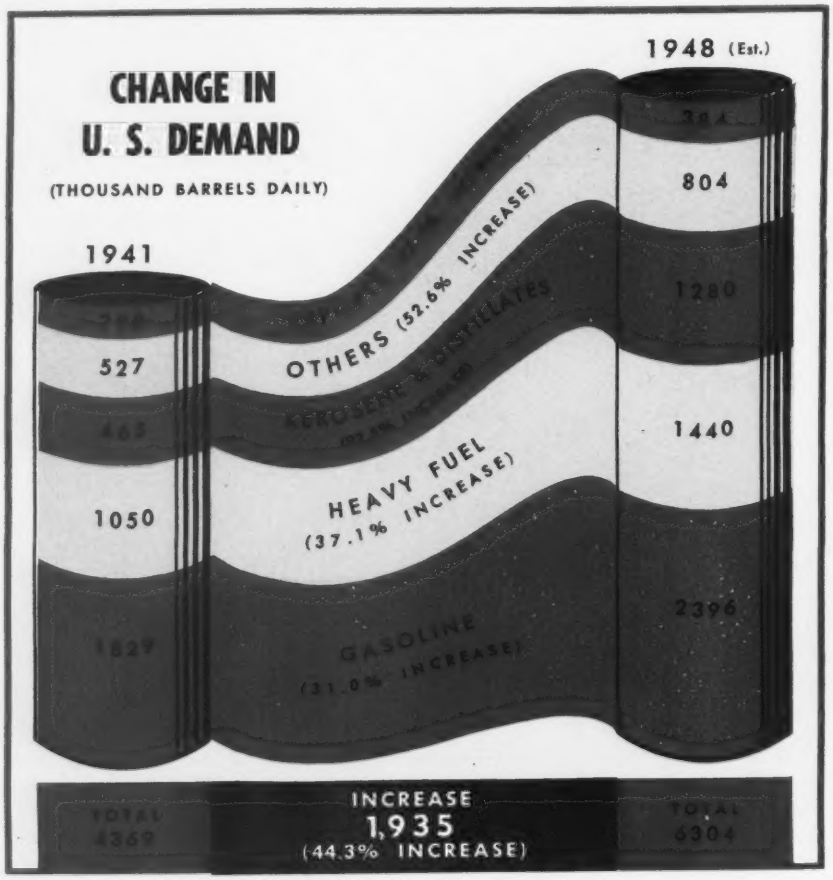
Progress with Petroleum

An address delivered by President Hines H. Baker before the Houston Rotary Club on Oil Progress Day, October 14.

TODAY, October 14, 1948, has been designated as Oil Progress Day. It is a privilege to have this oportunity to speak to you on some phases of the progress of the petroleum industry.

A Houston audience has a real interest in this theme. Approximately forty-five thousand people are employed in the oil industry in the fourteen counties embracing the Houston area, and at least ten thousand people are employed in collateral industries, which furnish the petroleum industry with supplies and services. In 1947 this fourteen-county area produced oil at the rate of 458,000 barrels per day—a total daily production in excess of that of the daily production of the whole State of Oklahoma—yielding a revenue of some $340,000,000. To this should be added the revenue from natural gas, estimated at about $21,000,000. The revenue from petroleum is more than two and one-half times the combined income produced from cattle, rice and cotton farming, and milk and poultry in the same area during the same year, and is five times the income derived from sulphur.

Progress means a movement forward, an advance to an objective, a going or getting ahead. In the past fifty years, our society has moved forward and advanced to a remarkable degree, particularly in technology, production, and standards of living. In no small measure this has been due to the development and achievements of a dynamic petroleum industry. Oil has reshaped and remolded and has rapidly transformed our method of living. It has changed and transformed our society. From petroleum has come the fuel for our automobiles, our trucks, buses and airplanes, and for our Diesel locomotives and ships, as well as for our oil and gas furnaces. To a large degree the difference between the standard of living enjoyed today and that of fifty years ago has been made possible by the progress made by the petroleum industry.



There are many criteria by which progress may be measured. Growth in size and increase in the variety of services offered, as well as advances in the prevention of waste, in themselves constitute progress. Measured by these standards, the petroleum industry has done well.

The oil business, as we know it, is less than ninety years old. It began in the year 1859 when Colonel Edwin L. Drake drilled a well in Pennsylvania and struck oil at a depth of 69½ feet. However, up to the year 1900 there was very little activity and relatively small quantities of oil were produced. In this period kerosene, used to light the lamps of the world, was the industry's principal product. The only refining processes available were distillation and treating, and the gasoline unavoidably produced was considered a nuisance and was thrown away.

Beginning with 1901, as a result of the discovery of a major oil field at Spindletop, Texas, and other subsequent discoveries, crude oil became more abundant. Railroads, and later ships and industries, shifted from wood and coal to fuel oil. Early in this century, fuel oil replaced kerosene as the industry's principal product.

With the end of World War I came the gasoline age. The increased production of motor vehicles and the larger and more important role of the motor car and the airplane in industrial society made the production of gasoline the major consideration.

At once a new technology was developed so that refining processes and refinery technique might keep pace with product requirements. While kerosene and fuel oil were the major products,

refiners relied upon a mere physical separation of the fractions present in the particular crudes available; but as the demand for gasoline increased, creative research developed many new and complicated refining processes, such as thermal cracking and catalytic cracking, designed to reform and rearrange hydrocarbon molecules so as to achieve maximum gasoline output.

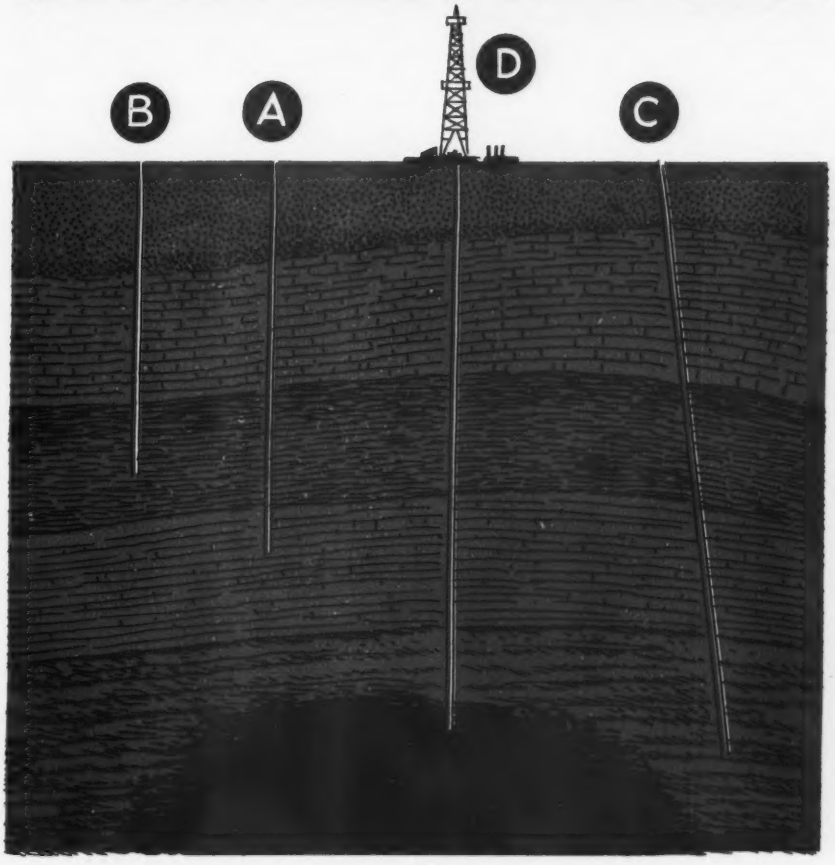
As the demand for petroleum products grew, new problems of transportation were created. Oil fields were frequently found at considerable distances from railroad lines or from deep water where the new refineries were built. Soon a network of underground pipe lines was laid to provide low cost transportation to the refineries. Oil transportation thereby entered a new era of efficiency and economy.

Under the system of private land ownership in the United States, there are usually a number of owners of the property overlying an oil field, and the leases on such property frequently are held by several competing operators. Since oil in an underground reservoir migrates freely, this situation, in the early oil fields, usually led to a competitive race to secure the maximum oil from each property. Each owner was privileged to drill as many wells as he chose upon his land and to produce those wells to capacity. His neighbors could do likewise. This situation led to very close drilling and to production at high rates. Each operator produced as rapidly as possible to secure the maximum quantities of oil and gas for himself at the expense of his neighbor. Such open-flow methods of production resulted in waste of otherwise recoverable oil through the dissipation of reservoir energy, the trapping of oil by water in the reservoirs, and production in excess of market demand.

These practices produced recurring periods of feast, when the markets were flooded with low price oil, and famine, when shortages occurred and prices rose to high levels. Discoveries came in cycles with the rapid development and flush production of new fields leading to great surpluses. Under such conditions the industry lacked stability and the public interest suffered.

In this situation the oil executive and the technologist, the engineer, the economist, the lawyer, and the legislator combined their energies and knowledge to devise methods and practices under which operating conditions and the rate

COMPETITION IN PRODUCTION



COMPETITION in the search for oil has contributed much to oil's progress; diagrammatically illustrated here is a typical instance where the perseverance of company D has succeeded in discovering oil after companies A, B, and C had given up or missed the oil reservoir.

of production might be controlled so as to obtain maximum recovery of oil from a reservoir. That is true conservation. It is achieved by good engineering practices. Under the physical conditions previously described, however, the practical application of these engineering practices requires the enactment and sound administration of conservation laws. In the past twenty-five years the industry has evolved sound engineering practices; most of the major oil producing states have enacted conservation laws and have created conservation agencies and provided the machinery to prevent the waste of this irreplaceable natural resource.

While the enactment and administration of conservation laws have been essentially state functions, the Federal Government has cooperated in numerous ways. The Interstate Compact Commission, created by agreement of the oil-producing states and approved by Congress, does important educational work in fostering conservation. A Federal law prohibits the movement in interstate commerce of the oil produced in violation of state law. The Bureau of Mines, a Federal agency, publishes fact findings which are useful to state agencies in fixing allowables. Thus, in practice, conservation is achieved today by close cooperation by the industry, the States, and the Federal Government, each acting in its proper sphere.

In the matter of oil progress, no single achievement is as great as that of conservation. Through conservation there has been a much greater recovery of oil from underground reservoirs, less waste aboveground of oil and gas, lower investments in wells, storage and other equipment, lower prices to consumers

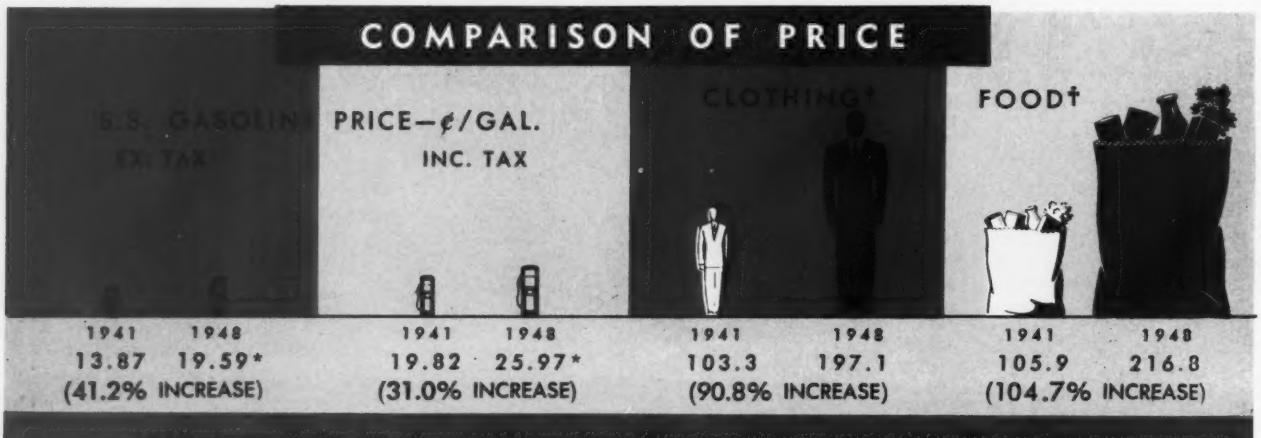
as a result of reduced costs of production, and a stable industry providing steady employment, sufficient quantities of oil to meet the demands of an industrialized economy, and a backlog of developed reserves to meet national emergency.

Another measure of an industry's progress is its ability over the years to furnish the public and the nation at reasonable prices with the products of the quality and in the quantities required. By this yardstick, the progress of the petroleum industry has been remarkable. Oil operations are complicated. They involve many separate functions: exploration; development of new reserves by drilling; the production of oil and gas from the underground reservoir; transportation to refineries; the refining of crude oil into products such as gasoline, heating oil, lubricating oils, greases, waxes, asphalt and chemicals; and the distribution of the products to the consuming public. To perform these functions, the industry employs ever-improving technology and organization skills. It sends exploration crews into swamps and mountains, even over waters of the gulfs and oceans; it drills wells as deep as 10,000 to 17,000 feet, transports oil by pipe lines for hundreds of miles, and uses scores of complicated, expensing refining units to convert the crude oil into finished products, finally distributing these products by special pipe lines, tankers, barges and tank trucks for hundreds of miles to within a few blocks of the ultimate consumer. It is amazing that the petroleum industry, with an investment in facilities of some twenty billion dollars, has devised techniques which make all these operations possible for an average refinery realization of 8 cents per gallon of product. This has come about only as a result of constant research and a ceaseless struggle to reduce costs on the part of the competing industry units in a free economy.

Progress in these respects has resulted in great benefit to the public. American consumers enjoy more oil products than any other people and at a far lower price than anyone else in the world. Moreover, the price they pay for gasoline, the industry's principal product, is relatively low today in relation to the price of other commodities. The average price of a gallon of regular gasoline in the United States today is 26 cents, which includes 6.4 cents per gallon for taxes. This price, including taxes, is nearly 4 cents per gallon less than the price obtained in 1920, and 10 cents per gallon less than the 1920 price if taxes are excluded. In relation to 1926, which is the Government's base period for comparison of all prices, the price of gasoline, exclusive of taxes, shows a slight decrease while the prices of other commodities show an increase of 68 percent. Since 1941, while the price of gasoline, including taxes, has gone up about 30 percent, the prices of other commodities generally have nearly doubled. In addition, the quality of gasoline and other products has been improved greatly by constant research. The octane rating of regular gasoline is now some 25 percent higher than it was fifteen years ago and, in some cases, housebrand gasoline quality is now equal to the quality of premium gasoline before the war. The improved quality of gasoline has made it possible for automobile manufacturers to introduce motors with higher compression ratios which give better performance without sacrificing economy.

This progress would not have been possible except for the success of the American oil industry in discovering and producing oil. Through the application of scientific techniques the United States has discovered and produced about two-thirds of the world's oil, although its ultimate potential oil resources are estimated to be only one-fourth of the world's total. In 1900, daily production was 174,000 barrels; in 1920, it had increased to 1,240,000 barrels; and in 1947 it had reached a total of 5,450,000 barrels. The conversion of these quantities of crude oil into the desired products has been due to American research and ingenuity in devising new processes to obtain the most valuable yields from crude oil.

Another criterion of an industry's progress is how well it serves the nation in time of emergency or need. The military requirements of World War II exceeded all expectations. The industry did an outstanding job in supplying product requirements both in the quantity and in the kind and quality of products needed. This accomplishment was possible only because of several basic factors. First, the oil reserves were available due to the practice over the years of sound conservation measures, which allowed production to be greatly increased in time of need. Second, the industry possessed the necessary pipe lines to transport the crude oil to refineries and the refining facilities to manufacture it into products. Third, and even of more importance, it possessed the technical skill and knowledge required to evolve new processes needed to manufacture new products and convert existing equipment and operations to produce maximum quantities of war products such as aviation gasolines, synthetic rubber, toluene, lubricants.

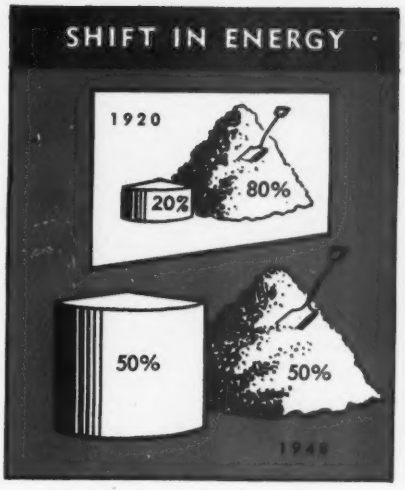


Clothing and food price indexes are for July, 1941 and July, 1948.

and materials for high explosives. A strong dynamic oil industry was able to make these high quality products in unprecedented quantities, so that allied planes, ships, tanks and motorized equipment might more easily and quickly bring about the final victory.

Petroleum has continued to meet unprecedented demands in the postwar period. Immediately following the war, it was anticipated that petroleum demands would decrease, but the reverse has been true. Petroleum demands have been increased by unprecedented amounts since the war's end. Domestic consumption this year will be 40 percent higher than in 1941. This sharp increase in requirements was a severe test of the industry. Replacements and expansion, which had been delayed for four years, had to be carried forward, not only to meet future needs but to provide a margin of safety which, in the past, had given the industry flexibility. Shortages in materials, particularly steel, have delayed this program somewhat; but despite this shortage, the industry has managed to get most of the needed new facilities into construction. For this alone it will spend about two billion dollars in 1948, or about one dollar for every barrel of oil it will produce. At the present moment, some margin of safety has been restored between supply and demand, but the difference is quite close and further investments are being made to increase capacity.

No doubt there is more concern with the present and the future of the petroleum industry than with its past. It is often asked: Will there be enough heating oil to meet the public's needs this winter? Will there be enough gasoline for next summer's vacation? Perhaps it might be said that a satisfactory answer to these inquiries is the true criterion of progress. If so, the industry still measures up; its record is good. Last year, in spite of an unusually cold winter, it was able to meet practically all demands for oil for home heating in the colder sections of this country. Predictions last spring of a gasoline shortage have since been proved incorrect. By means of tremendous capital investments and extraordinary work on the part of employees, the industry has been able to meet record demands for all products with minimum inconvenience to the public. The current outlook is that the industry will be able to meet petroleum demands in the near future with much less difficulty than it has during the past two years.

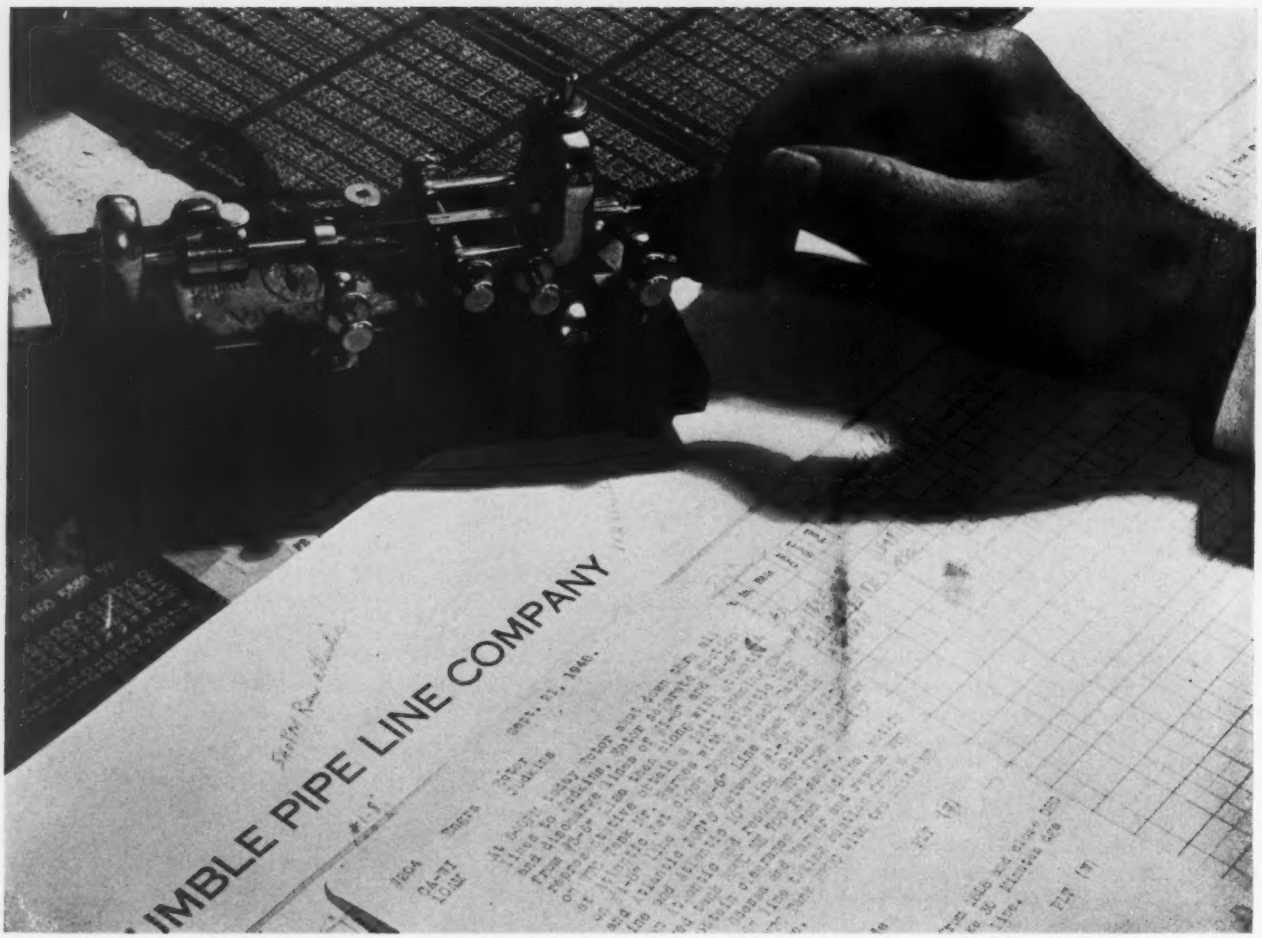


Another question frequently asked which bears strongly upon any criterion of progress is: Will the United States have enough oil for the future? The answer, of course, depends upon many circumstances. At the moment it can be said that a continuation of favorable conditions for private competitive enterprise will provide American consumers with sufficient liquid fuels, gas and coal and provide the power for a dynamic and expanding economy. There is an ample supply of the combined energy resources to meet our needs for a long time; and price adjustments will regulate the relative use of these resources so that the demand and supply of each will be balanced. Present technology already makes it possible to convert coal and gas into liquid fuels if people are willing to pay the cost for such conversion over a long period of time. If the discovery of crude oil should be less than the demand for liquid fuels, a large production of substitute liquid fuels could be developed from coal and shales. Before such a transition occurs, there will be numerous developments occurring to continue a balance between oil supply and demand. Much more oil remains to be found in the United States, probably as much as or more than has been found to date. Moreover, potential foreign production is so great that large quantities of foreign oil should be available to help meet the United States needs. In addition, coal can be used directly in place of oil without any real disadvantages, especially for heating and stationary power; and finally, substantial economies can be realized in the use of oil by designing more efficient internal combustion engines.

In 1920, coal supplied 80 percent of the energy requirements of the country —four times as much as oil and gas. Between 1920 and 1947, the supply and demand for oil and gas in the United States increased fourfold so that at the end of this period oil and gas were supplying as much energy in the United States as coal, although coal resources are far more abundant. Because of relative convenience and low price, numerous industrial and home users switched to oil as fuel. This tendency was accelerated by the rapid advance in the price of coal. Inevitably this situation required an adjustment in the price between oil products and coal to bring about a reasonable balance in the relative use of the two fuels. This adjustment has been taking place in the past two years. It is still going on.

If allowed to function without Government interference, price will adjust the supply and demand of the numerous competitive fuels. There need be no fear about continued progress if the United States continues to rely upon the competition in the oil industry and between petroleum and coal, which has been so successful to date in providing abundant supplies of energies at reasonable prices. In meeting the energy requirements of the future, the petroleum industry will do its share.

But the progress of the petroleum industry has not been confined to physical progress. Back of this growth in quantity and quality of product, the production of ever more varied and better products, this efficiency which leads to research, improvement in techniques, prevention of waste, lowering of costs—back of all these and responsible for them in large part is a continuing progress in the development within the industry of a live sense of public responsibility, a consciousness of the public interest, and a growing desire within the industry to promote the public interest and welfare. Progress in developing this spiritual resource will lead to progress along all worthwhile lines. It adds new incentives to the profit motive, and gives private enterprise that balance and poise and stability that prevent its own destruction through purely selfish efforts. We have not arrived at final achievement in this area—far from it. But the evidences of progress are all about us. And in this fact lies the greatest cause for confidence in the industry's future.



TAPPING OF DISPATCHER'S TELEGRAPH KEY ORDERS CRUDE OIL MOVED THROUGH THE HUMBLE PIPE LINE SYSTEM

DELIVERED ON SCHEDULE

Pipe Line dispatchers are key men in moving crude oil from wells to refineries and ships

ALL day and all night, week ends and holidays, year in and year out, there is one office in the Humble Building in Houston that never closes. People are always busy there; the lights are on every night.

There is another room just like it in each division office of Humble Pipe Line Company, in north, south, east, and west Texas; and the night is always lighted by the glow from windows of smaller rooms at each pump station along the far-flung Humble Pipe Line Company system.

In these offices men sit at telegraph and telephone sets, their fingers tapping out the orders and messages that keep more than 750,000 barrels of different grades of crude oil moving through Humble pipe lines each day . . . moving slowly to inland and coastal refineries and dockside terminals for re-shipment by tanker.

The men in these offices are oil dispatchers. Like train dispatchers, they handle the orders for the safe, on-schedule shipment of different kinds of crude oil to the refineries where it is converted into vital petroleum products. Today, with new lines and equipment installed since the war, Humble dispatchers are handling orders for more oil than ever before, moving the tremendous volume of crude oil necessary to fill the nation's requirements.

Humble Pipe Line Company transports more oil than any other pipe line system in the U. S.—more than a quarter of a billion barrels a year. This mighty task employs some 2,875 people, who operate pump stations, repair and maintain equipment, lay new lines and build new units, and perform all the other vital, closely-coordinated duties.

Of this number only 22 are dispatchers. It is they who supply the routing, precision timing, and accurate judgment

necessary for the safe delivery of cargo. Their fingers are constantly on the pulse of all pipe line operations. Through the Company's private communications systems—15,000 miles of company telephone and telegraph lines—they keep continual contact with division and district offices as well as all 137 trunk line pump stations.

This telegraph system carries the equivalent of 1,500 ten-word telegrams per day; more than a dozen telephone operators, in the Houston office alone. handle an average of 1,500 calls per hour.

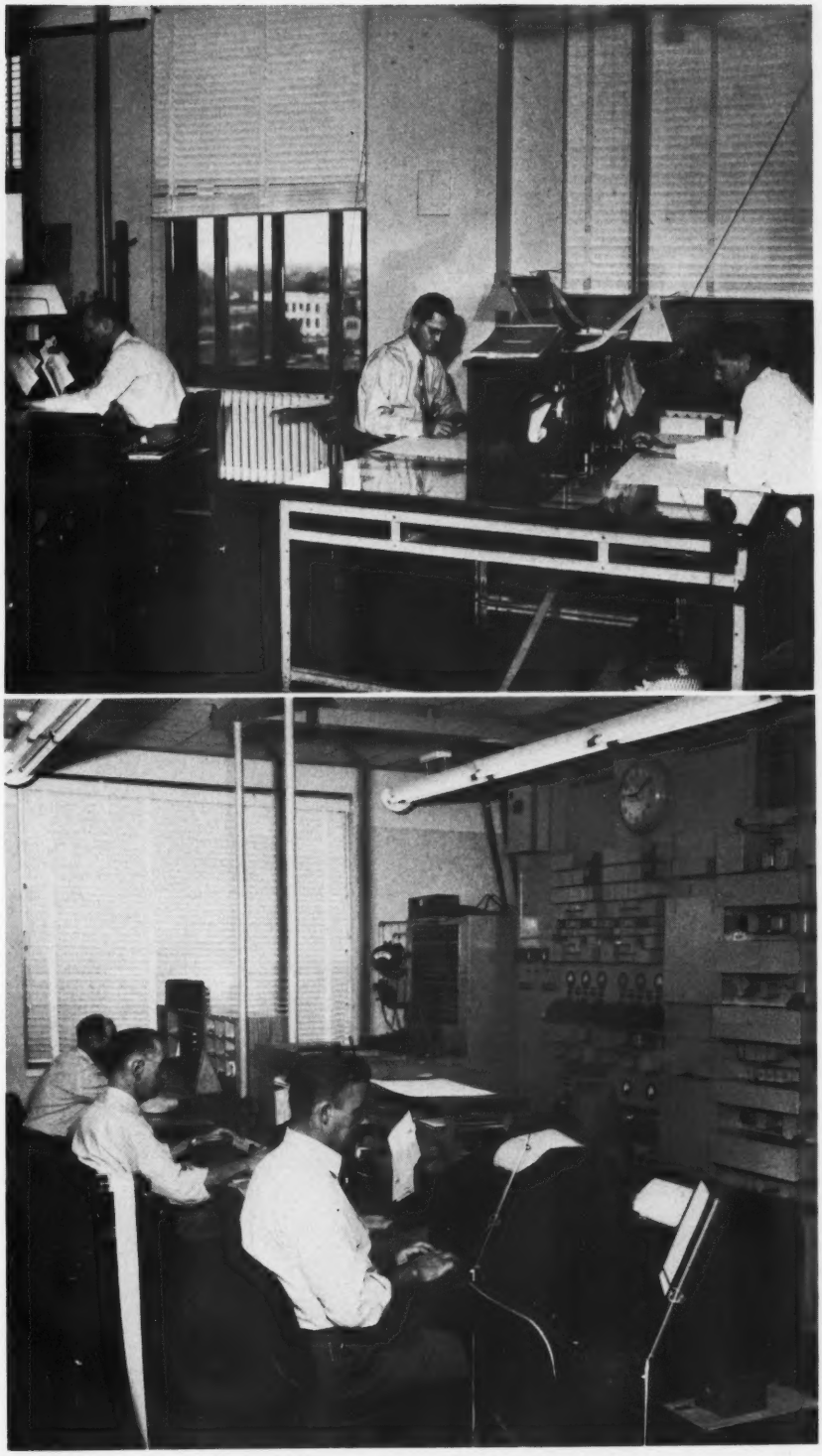
Over these lines of communication go the chief dispatcher's orders for the shipment of different grades of oil through a network of lines to different destinations, on schedules as exact as those of a crack train.

In the case of the railroad dispatcher, correct orders must go through to prevent collisions as well as to maintain schedules. The oil dispatcher, although his cargo travels in underground pipes, has a similar concern—he must prevent the "collision," or mixing of different grades of oil in the same lines.

Just as many trains use the same rails, so are different oils shipped in different batches through the same pipe line at the same time, one grade pushing the other through the line. One batch may be best adapted to making fuels; the other, best for refining into lubes and greases. If these crude oils become mixed, the value of each will be altered, product yield will be changed, and Humble Pipe Line Company, as a common carrier, must stand the loss. Thus the dispatcher must not only see that 750,000 barrels of oil a day is kept flowing through the lines on schedule, but he must also make sure that this oil is put into the lines, transported, and diverted from the lines into proper storage without appreciable mixing.

The orders that accomplish this originate from the chief dispatcher's office in Houston, so of course the story of dispatching oil begins there. First, the matter of schedules.

Humble Pipe Line Company's lines extend over most of the state of Texas, connecting to Humble Oil & Refining Company's producing wells and to wells owned by other companies. From the Proration division, the dispatcher receives a report on how much oil these wells will be permitted to produce during each month. He also is informed of approximately how much oil Humble Oil & Refining Company will buy for its own account, and how much oil will be transported for others on a common carrier basis. All purchase and sale agreements affecting oil movements through Humble Pipe Line Company's



ALL ORDERS for the shipment of crude oil through the Humble Pipe Line system originate from the Houston dispatching office, top, which has never been closed since the day it opened in 1919. Division dispatching offices, like the one below at Midland, receive the orders from Houston and relay them by telephone to Pipe Line pump stations where they are executed.

system also are considered. Thus, the total amount of crude oil which will enter the system is known well in advance. Gathering lines bring this oil from the wells to storage tanks at the trunk line pump stations, where it is held until the chief dispatcher orders it moved into the main lines.

At the delivery end of the line, the dispatcher receives a time schedule of the amounts and kinds of oil which will be required at Humble's Baytown refinery and elsewhere, including the requirements for loading sea-going tankers.

From these advance reports the chief dispatcher knows the amounts and the grades of oil which will enter the system; he knows where it will enter; and he knows the amounts and grades of oil that must be delivered and the time and place of delivery. Knowing these things, he can make up an exact schedule of shipments, and prepare the necessary orders.

For instance, suppose Baytown Refinery needs 150,000 barrels of West Texas Light Crude on the 15th day of the month. From reports received from all pump stations, the chief dispatcher has a record of every barrel of oil in storage or being shipped in the entire pipe line system, and he finds the required amount of the desired oil in storage at McCamey Station. All that remains is to move it to Baytown, 670 miles distant, *on schedule and unmixed.*

Now, between McCamey and Baytown are combinations of lines of several different sizes, so that the oil will move at varying rates, further complicating the making of a schedule. Yet through calculations, experience, and judgment, the chief dispatcher finds that the shipment will require about 13 days. Therefore he must issue the order to start the oil moving at least 13 days ahead of delivery date, and check on its progress constantly all along the line.

Thus the order goes out, directing the McCamey station to stop other trunk line shipments, to divert the incoming stream to storage tanks, and to start the light crude moving through the main lines. By precise timing and execution of the orders, the light crude follows immediately behind the different oil ahead, pushing it forward without appreciable mixing. The orders are so planned and timed that there is no space at all between the two different oils, and constant pressure in the line prevents them from mixing except over a small area at point of contact.

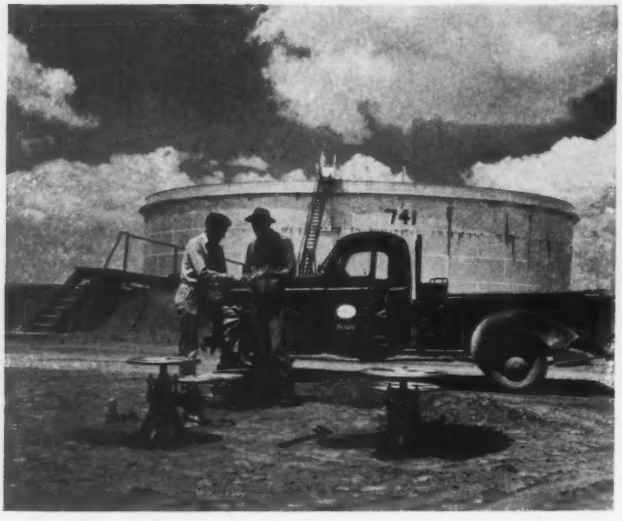
When the West Texas Light Crude starts moving out of McCamey, the next station on the line is notified of the time it will arrive and is given instructions on how to handle its shipment to the next point. For two hours prior to the time of arrival the oil going through the line will be tested and identified at 15-minute intervals to insure interception of the cargo. This procedure is repeated all the way to Baytown, where the cargo will arrive safely and on schedule 13 days later.

The chief dispatcher's orders reach the pump stations on the main lines via the Pipe Line division offices, in this case the West Texas division office in Midland. Midland is one of Humble Pipe Line Company's "hottest" division points, being located in the heart of the Permian Basin, the world's most extensive oil producing area. The division dispatcher's office, in addition to relaying all orders and messages to and from the district offices and pump stations, records hourly reports from all 33 main-line pump stations in the division, compiles the report figures in a daily accounting and forwards both reports and balance sheets to Houston. On the day shift this job requires a division chief dispatcher and two field dispatchers.

All crude oil movement *orders* (as distinguished from *messages*, which concern maintenance, repairs, etc.) reach the division office by telegraph, where they are copied by a dispatcher seated near the clacking key and forwarded to the various pump stations by telephone. Hourly reports and compliance reports are also received by telephone headset, with a dispatcher rapidly recording columns of figures on special report sheets. In addition, a teletype machine is also used for sending many messages to Houston and other points.

To an outsider, work in the division dispatching offices, as well as in the chief dispatcher's office, seems hurried and confusing. The heavy volume of communications keeps the dispatchers hopping from telephone to telegraph and from one long report sheet to another, while in between times they compile stock sheets and situation reports and all the other reports necessary to

STOCK GAUGER and assistant at McCamey check an order before turning valve to send crude oil in Tank 741 into main lines.



AFTER RECEIVING an order, stock gauger passes a copy to the station engineer, who participates in carrying out instructions.

keep the Houston office exactly informed on all operations.

Yet the work progresses handily. Years of experience enables the dispatchers to handle all circuits and shift from one report to another coolly and efficiently. It's just routine to them, although they may admit that "it takes a long time to get the hang of it."

From division dispatcher the orders go by telephone lines to stock gaugers at the pump stations, where the orders are copied and repeated back to avoid error. When not carrying out orders or taking information for reports, the stock gauger is always near his telephone set, awaiting the orders that will start the stocks of oil in the station's big tanks moving toward the consumer.

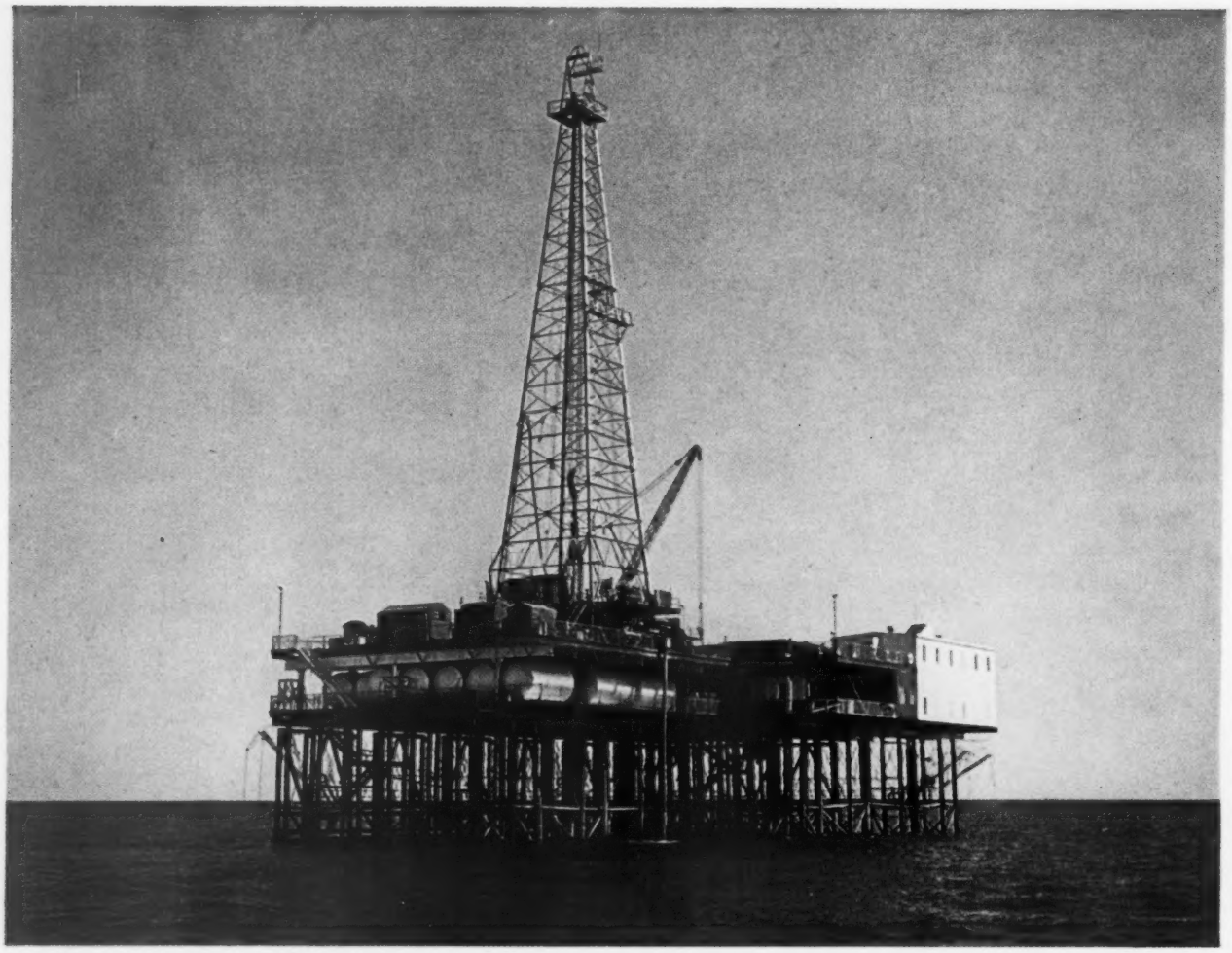
The stock gauger's job is also a busy one, and at some stations he has an assistant. To make up the hourly reports for the division office he must take gauge readings on all "working tanks" —tanks which are being filled with oil from the gathering lines or being emptied into the main lines. His hourly reports also include information on units on the line (pumps operating), revolutions per minute of the units on the line, pressure on the line, and the gravity and BS&W (basic sediment and water content) of the oil being pumped through the lines. He must make tests of oil samples from the line to determine the latter. He also makes a daily stock report of the amounts and kinds of all oil in storage at the station.

Upon receiving an order, the stock gauger passes a copy to the station engineer. At the time specified the engineer arranges the manifolds, or oil switching systems, necessary to execution of the order. The gauger himself "changes tanks," opening and closing valves so that the contents of the desired storage tank will flow to the main line intake manifold.

After execution, the stock gauger notifies the division office that the order has been properly carried out, and the division dispatcher in turn notifies the chief dispatcher in Houston.

Thus the circuit is completed, and another cargo of oil is on its way through the Humble Pipe Line Company system. Though underground and unseen, flowing beneath prairies and mountains and rivers, it will be traced and checked through every mile of its journey across the broad expanse of Texas — "shadowed" by oil dispatchers who are key men in moving crude oil from the well to refineries and to tidewater.

DISPATCHERS RECEIVE continuous information on all pipe line operations. Hourly gauge reports on working tanks, like one taken above, reveal exact amount of crude oil in storage.



CREWS ON HUMBLE'S GIANT IN THE GULF FIND SEA LIFE GOOD IN LIVING QUARTERS AT RIGHT OF PLATFORM.

FAVORITE recreation aboard the platform is fishing. Crewmen catch some big ones, too.

Life with Oil Men at Sea

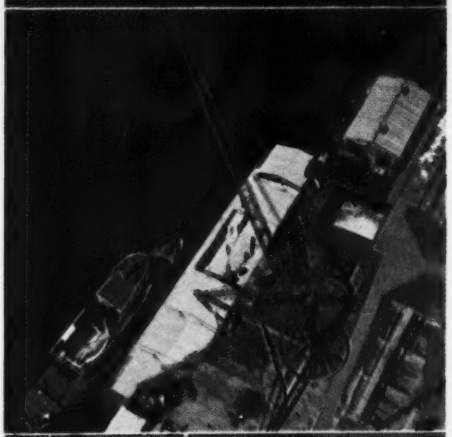
COURAGEOUS men have always battled the winds and waves of the sea to gain new frontiers, new worlds, better lives.

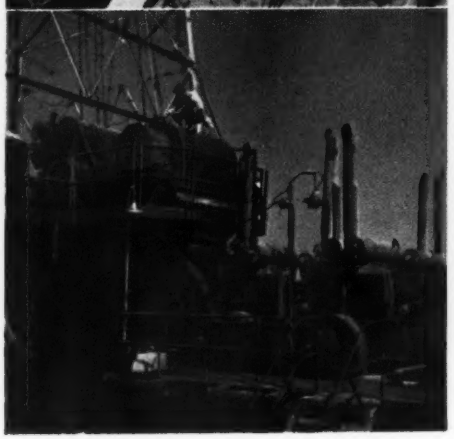
Today it is the American oil man's turn. Today, when petroleum is so vital to our nation's industrial production and security, men of the oil industry are standing to sea in the Gulf of Mexico for their most risky venture, seeking new oil frontiers and future reserves below the waters of the continental shelf.

Life for the men who work on Humble Oil & Refining Company's biggest deep-water drilling platform, located eight miles off Grand Isle, Louisiana, is almost like living in a modern building ashore—*almost*, for there is the drilling rig above and the sea below.

These men live in a two-story housing unit which is located at the edge of the platform and accommodates 54 men, two or three to each small, neat room. Only the faint hum of machinery reminds the occupants that they share the man-made island with a big drilling rig.

Family-style meals are served in the platform dining room, with plenty of Louisiana coffee and fresh milk. There's plenty of food in bad weather too, for the cooks maintain a two-week's supply in case rough seas temporarily interrupt boat service.





AT LEFT, top to bottom, crew members come aboard by special safety gangway; supplies are swung aboard in cargo nets; crane unloads a barge; "good housekeeping" is practiced at sea.

Communication is a prime factor in safety, and although the shore is only dimly visible from the platform, the crews are never "out of touch." Instant communication with shore is maintained by high frequency radio and by marine telephone, and a boat stands by at all times in case of emergency.

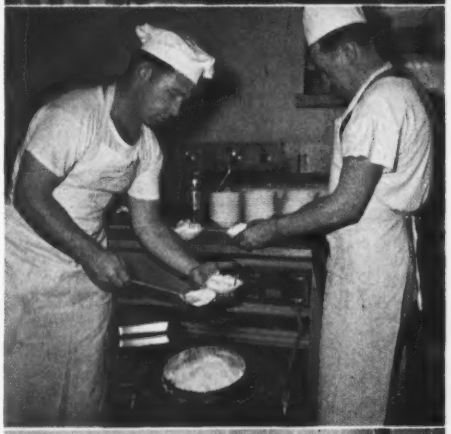
Crews live aboard the platform 78 hours during the week, working the usual 40 hours. After leaving their tour of duty on the rig floor, sending the bit deeper and deeper, they may take showers in clean bathrooms and wash work clothing in a machine provided for the purpose. Some men spend leisure time in the comfortable recreation room, reading, or listening to the radio; others break out fishing tackle and try their luck over the side.

At the end of their week's duty, when relief arrives, crewmen go ashore by radio- and radar-equipped boats which can navigate the narrow channels to dock even in heavy fog. Bus companies have arranged schedules to meet incoming boats at Grand Isle headquarters so that employees lose no time in reaching their homes.

Humble planned the platform itself for maximum safety and built it to withstand 120 mile-per-hour winds plus 35 foot waves. So far it has safely weathered one Gulf hurricane, although the crew was evacuated.

The first hole drilled from the platform discovered a salt dome; the second hole struck oil and flowed 877.92 barrels of oil a day when completed on August 15. It is now producing 228 barrels per day, the allowable set by the Louisiana State Conservation Department, and a third hole is now underway.

Though seagoing wildcatters make use of every safety device and live as comfortably as conditions will allow, the old adventurous spirit of the oil industry still lives. Every man on Humble's deep water units volunteered for "sea duty"; with science as a partner they are pioneering the search for oil at sea.



AT RIGHT, top to bottom, hungry crews eat family style; two cooks sample home-made ice cream; crewmen hear the news in recreation room or read in their comfortable quarters.

Contrasts in the East Texas Scene

By E. M. Schiwetz

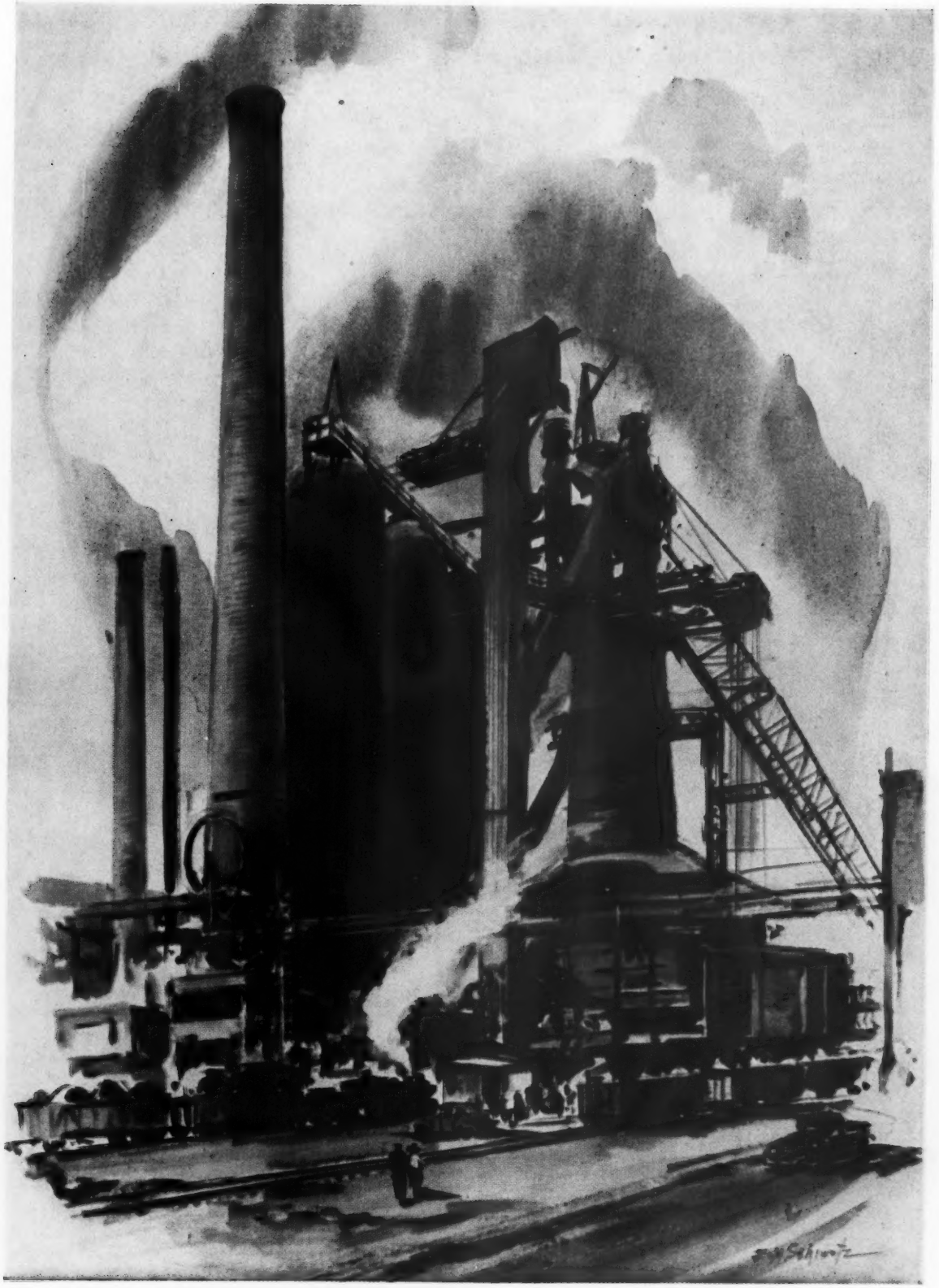
EAST Texas colors are built around brilliant reds and greens, the red of the hills contrasting in gay Christmas motif with the green of the stately pines that cover the countryside.

There are also contrasts in East Texas cities to intrigue the visitor and enrich the lives of those who make their homes there. In Tyler, youth and age live side by side as the graceful old architecture of the county courthouse contrasts with the functional beauty of a modern office building just across the street.

But of all East Texas contrasts, none are more interesting than those to be found in its industry. There is oil, of course (front cover). But there are sawmills, too, their millponds smelling dankly of wet wood, the smoke from their burning waste carrying a deliciously pungent odor of aromatic oils. And, in only a few minutes drive, one can leave an oil field and a saw mill and drop down out of the hills upon a giant steel mill looking for all the world like a part of Pittsburgh.

THE SMITH COUNTY courthouse in Tyler is emblematic of the grand old mid-Victorian style of courthouse that stands with authority in many of our county seats. The colorful wardrobe of famous Tyler roses at its feet gives an added regnance to this courthouse.

SAWMILLS ARE NATIVE to the East Texas Pine Belt, from which approximately one and three-quarter billion board feet of timber is cut in an average year. This one is so large that it was difficult to work all of it into the picture. A boom is lifting a log from the stockpile and will transfer it to the moving chute at the left, up which logs are carried into the mill to be trimmed on four sides and then sawed into lumber.



GIANT STEEL MILL at Lone Star is a comparative newcomer to the East Texas industrial scene. Only the blast furnace, the tall smokestack, and three heaters to supply the blast furnace with super-heated air are shown here. The plant mines its own ore from nearby hills, gets its coal from Oklahoma, and produces 850 to 1000 tons of quality pig iron, as well as useful by-products, every day.

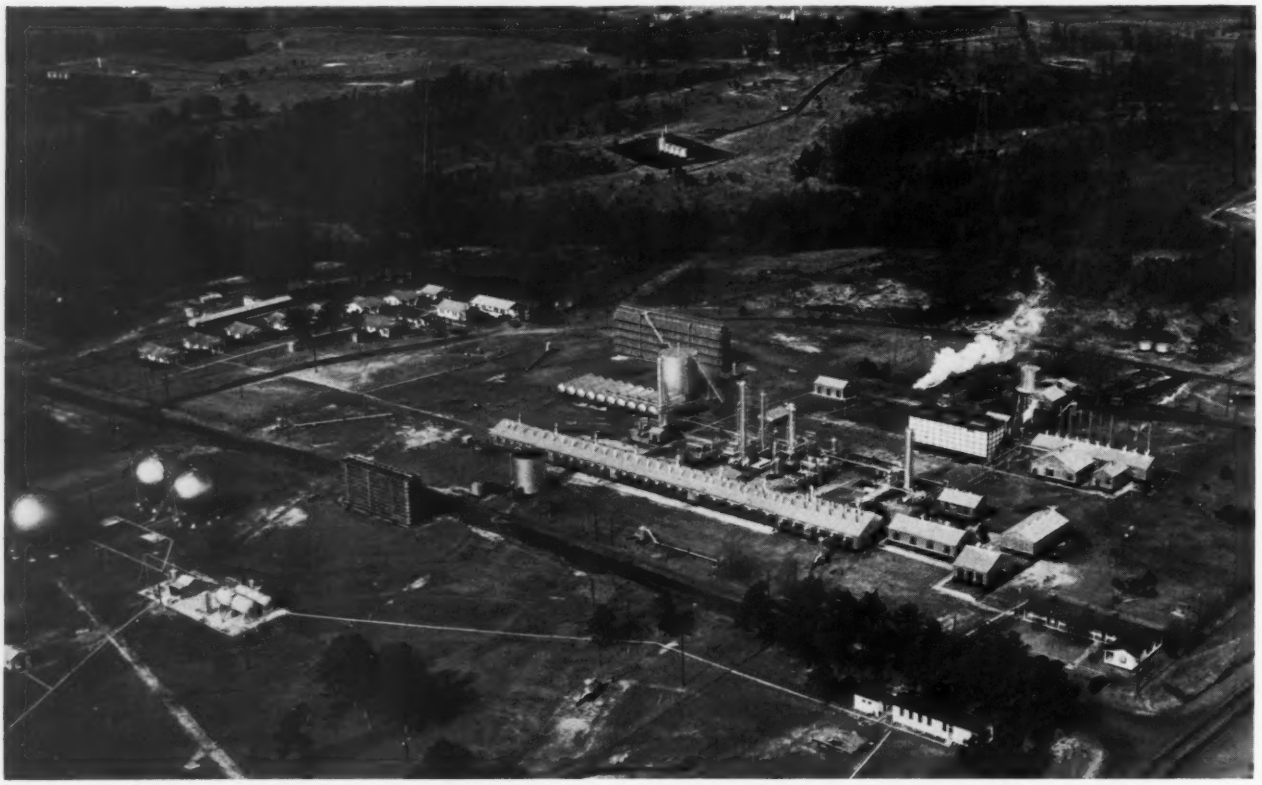
OIL *and* East Texas

Discovery and development of mineral resources have made great contributions to the economy of a land already rich in forests and water supplies

THE things that sold early settlers on East Texas were those two basic fundamentals of pioneer life—wood and water. In the long run, it was the lakes and rivers and forests of East Texas, even more than the attraction of good land, that brought to that region the first extensive and permanent white settlements in the State.

Wood and water are still important to East Texas. In fact, wise development of those two natural resources has made them considerably more useful and valuable than they were during pioneer days. Today, however, the area no longer depends entirely upon its agriculture, its forests, and its water supplies for its economic growth and development. By a happy circumstance undreamed of by early settlers, huge deposits of oil and gas lay under much of the land on which they lived and worked. And, from the rolling red hills, iron ore is mined to be made into pig iron at East Texas and Gulf Coast mills. Discovery of these rich minerals—oil, gas, and iron ore—changed the whole course of East Texas history.

Humble's East Texas Division is made up of 44 northeast Texas counties; an area of about 33,500 square miles, which is larger than many states in the Union. In this area lies one of the largest oil



HUMBLE'S NATURAL GASOLINE PLANT at London. The Company owns two others in East Texas, has another under construction, and has interests in two more. From these and other gas plants in the area, 54,363 barrels a day of liquid fuels are extracted.

fields in the world. It was too large, in fact, to be given the name of a town or a mere locality; they just called it the "East Texas oil field." More than two and one-half billion barrels of oil have already been produced from this field, and it is estimated that it will produce that much more! There are other oil and gas fields in the area, too; 13 of them are large enough to be considered major fields.

East Texas is a land of oil, lumber, steel, and roses—a land of good roads, good schools, and good people. And to different people it means different things. As far as the metropolitan-minded northeast Texan is concerned, Dallas is the last word in comfort and culture. Others with simpler tastes will tell you there's nothing to compare with an old fashioned East Texas farm dinner of home-cured ham, sweet potatoes, black-eye peas, corn bread, and fresh, cold buttermilk.

Impact of Oil

But today no one thinks of East Texas without thinking of oil, for the impact of oil on East Texas economy has been tremendous; it is unlikely that any commodity has made a greater contribution to the region's economy and therefore to its general welfare. Oil money has been responsible in large measure for the quality and extent of the splendid East Texas road system. It has built fine schools. It has built villages into thriving towns, and towns into bustling cities. Along with oil, other enterprises came into East Texas, such as those supplying heavy machinery for drilling and other oil field operations, well service organizations, and consultants and specialists of all kinds. One has only to ride up and down the streets of Kilgore or Longview or Tyler to realize the extent to which this influx of other industries allied with oil has come about.

And there is plenty for all of them to do. There are at present something like 100 oil and gas fields in the area. Thirteen of the oil fields are major discoveries; that is, each one of them originally contained an estimated 20 million barrels or more of recoverable oil. Six of the 13 originally contained more than 100 million barrels of recoverable oil. They are, in the order of their importance, East Texas, Hawkins, Van, Talco, Powell, and Mexia. The most important gas fields are Carthage, Opelika, and Waskom, each of which originally contained more than 500 billion cubic feet of gas. Carthage, by far the largest of the three, has a proven productive area of about 330 square miles and an estimated reserve of 4 to 5 trillion cubic feet of gas.

LOOKOUT TOWERS, looking somewhat like oil derricks, are maintained to spot forest fires in East Texas. The great East Texas Pine Belt embraces 36 counties, and lumbering is a major industry. In an average year, one and three-quarter billion board feet of valuable timber are cut.

There are several small refineries in East Texas and a number of plants processing natural and casinghead gas. In all there are eight gas recycling plants, 13 scrubber plants, and 26 natural gasoline plants handling a total of 533 million cubic feet of gas a day. From this gas, 54,363 barrels a day of liquid fuels are extracted. Humble owns and operates three of the natural gasoline plants (American, Kilgore, and London, all in the East Texas field) and has interests in two others (in the Hawkins and Van fields). The Company also has another natural gasoline plant under construction at Pickton.

First Oil in 1867

Many people, in associating oil with East Texas, date their thinking from the discovery of the great East Texas field in 1930. That is not in keeping with the facts. The first commercial oil production in Texas was at Nacogdoches in 1867, but it was merely a trickle. In 1895, oil was discovered in the Corsicana shallow field, not a spectacular discovery, but enough to push state production up to 1500 barrels in the following year. In 1897, Texas produced 66,000 barrels and increased this figure to more than half a million barrels each in 1898 and and 1899. Discoveries that were eventually to give Texas almost half of the total U. S. production were on the way, and they were coming fast. But it was not until 1921 that the first oil field of major importance was discovered in East Texas at Mexia. Then came Powell in 1924. Some oil had been discovered in shallow sands at Powell as early as 1900, just a year before the spectacular discovery at Spindletop on the Gulf Coast, but little oil was produced at that time. The field's deeper sands, which were to establish it as a major producer, were not tapped until 1924.

With Mexia and Powell, East Texas was getting somewhere in the oil world. They were the first major discoveries in East Texas and they were important eventually because they directed attention to the Balcones fault, a geologic structure running northeast-southwest through east and east-central Texas.

TOMATO ROW at Jacksonville is a busy place around the harvest season. Tomatoes are an important cash crop to farmers in this area.

FRUITS, as well as vegetables, are adding to the annual cash income of East Texas farmers. Here, pickers are harvesting a good peach crop.

CADDO LAKE is just one of the places where East Texans, known far and wide as ardent anglers, can try their luck. Usually it's good.

After these two fields were brought in, oilmen began moving northeastward in a curving sweep, playing back and forth along the geologic fault like a pianist's fingers over the keys.

Humble Enters the Area

Early development of the Mexia and Powell fields marked the entry of Humble Oil & Refining Company into that region. Although the fields were not Humble discoveries, they were, in the words of Wallace Pratt (onetime Chief Geologist for Humble and late a vice-president of the Company), "The foundation stones upon which Humble's greatest early success as a producer was based." Since Humble is now the largest crude oil producing company in the United States, Mr. Pratt's statement about Mexia and Powell holds considerable significance. Humble's East Texas position was further strengthened in 1927 when the Company discovered the Boggy Creek field, and in 1929 when it participated in the development of the Van field.

Then, in 1930, oil history was made for East Texas and for the world. In that year, "Dad" Joiner brought in the discovery well on the edge of the great East Texas oil field.

The East Texas field proved to be an almost unbelievably huge reservoir. In less than nine years after its discovery, it had produced *more than one and a quarter billion barrels of oil* — more than all of Europe (outside of Russia) and most of Asia had produced in their entire history up to that time.

It was inevitable that such flush production on a short-term basis should lead to trouble. In fact, what happened to East Texas shouldn't happen to an oil field! In the flood of overproduction, oil prices dropped to ten cents a barrel, far below the cost of production in other fields, threatening the ruin of hundreds of producers and the loss of large reserves under the wells that were being abandoned. Matters were made worse because there were thousands of landowners in the field, and each was bent upon drilling the most possible wells in the shortest possible time. Drilling was cheap and easy in the field; usually it took no more than a couple of weeks and capital of $10,000 or so to put in a well. Earnings from the first producing well in a tract were used to drill other wells, and earnings from those were used to drill still others, until oil wells stood together in some areas as thick as trees in a forest.

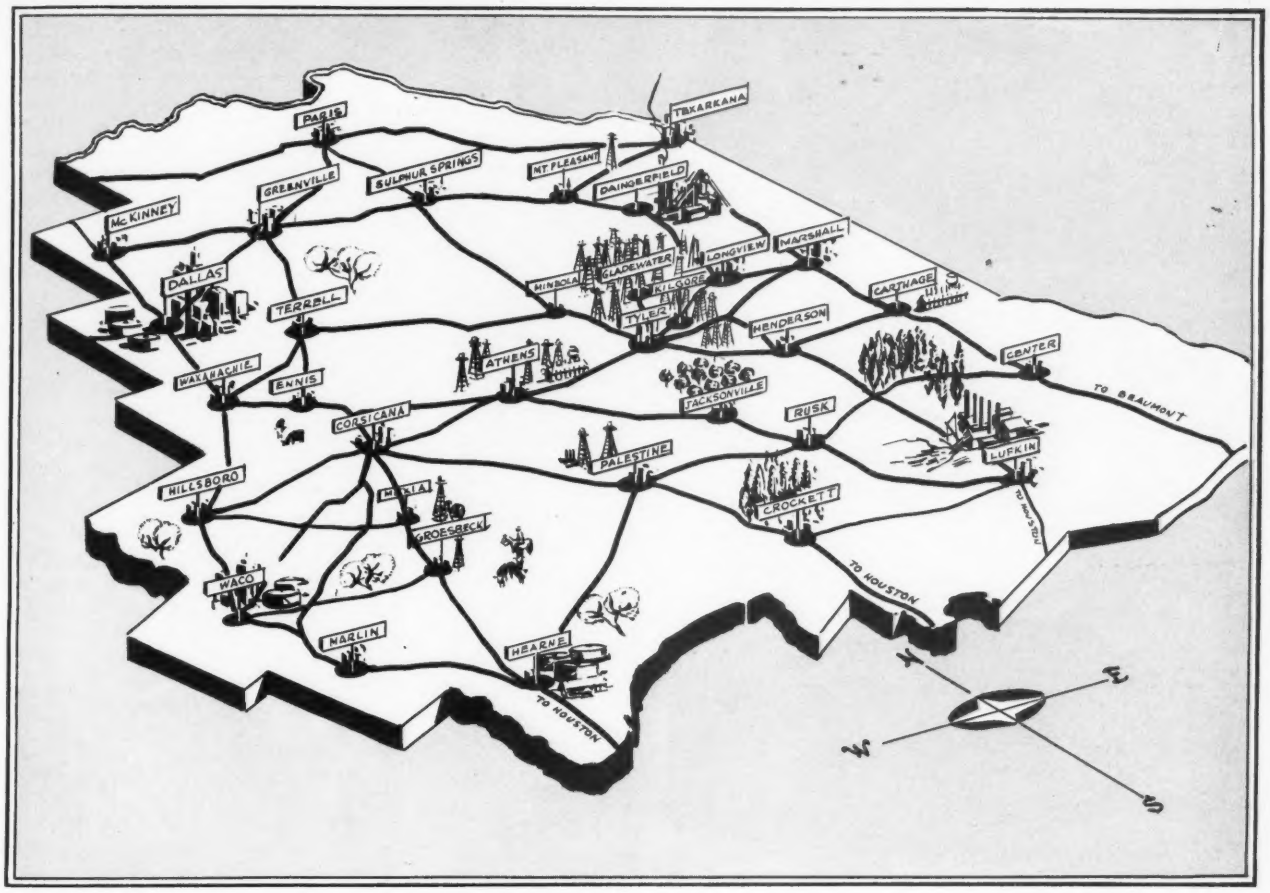
Trouble set in fast. Pressure in the reservoir started dropping, and many wells had to be put on the pump. Salt water came in to take the place of oil that had been withdrawn so fast, and some wells began to produce more salt water than oil. It was time for a general stock-taking, more discretion, and a lot of good, common sense. If the real value of the large East Texas field was to be realized, something had to be done about it.

Something *was* done about it. Oil men, engineers, lawyers, scientists, land owners, legislators, and others all worked together and came up with sound petroleum conservation laws. And, from the time these wise laws were put into effect, the oil supply situation began to improve. One requirement was that wells must be spaced far enough apart to insure economical recovery of oil from each reservoir. Another was that production of every new oil well must be set by a state regulatory body, so that each may have its pro-rata share of the field's production. This practice, along with well spacing, maintains reservoir pressure and insures that a much greater volume of oil and gas will ultimately be recovered. The significance of these conservation laws to our national economy and national security cannot be overestimated. A grateful nation might well have paused for a few moments after Pearl Harbor to give thanks for the lessons learned by the oil industry in East Texas, and for the remedies that grew out of those lessons.

Results of Conservation

What conservation did for the industry in general, it did for the East Texas field in particular. Without conservation laws, the field might have come to an untimely and shameful end. As it is, more than 22,000 of the 26,000 wells in the field are producing oil today. Conservative estimates now conclude that the field is no more than half depleted, and that another 2½ billion barrels of oil may yet be recovered from it. The oil field that lived so hard and fast a life in its youth has settled down to the calm, respectable life of a good citizen.

Oil discoveries were still to be made in East Texas after 1930. To mention only a few of the better-known fields, there were Long Lake and Cayuga in 1933 and 1934; Carthage, Talco, and Sulphur Bluff in 1936; Chapel Hill, Pittsburg, and Hawkins in 1940; Coke and Quitman in 1942; and New Hope and Pickton in 1943 and 1944.



There are today some 27,049 producing wells in the 44 counties that make up Humble's East Texas Division; of these, 3319 are owned by the Company. Total East Texas production for the month of July, 1948, averaged 473,323 barrels per day, of which more than 84,000 barrels a day was produced from Humble wells.

In the East Texas Division, Humble Pipe Line Company has 1703 miles of pipe line, including 1356 miles of main (trunk) lines and 347 miles of field gathering lines. Through this system, an average of 126,129 barrels of oil a day was being moved at the time this article was written—110,000 barrels a day from lease connections in the field and 16,129 barrels a day from outside sources. In addition to oil, other hydrocarbon liquids are moved out of East Texas through Humble lines at the rate of about 13,000 barrels a day in summer and about 10,000 barrels a day in winter. Fourteen main line pump stations and 11 smaller field stations provide the necessary power to move this volume of oil. There are three major tank farms in the Division at Hearne, Groesbeck, and Longview.

The importance of oil and gas to East Texas is difficult to tie down in the form of facts and figures, but a few illustrations may well be made. During the 15 year period between 1930 and 1945, population of the entire 44-county area covered by this article had increased by 125,000, and the population of certain cities and localities in and near the East Texas field had increased enormously. Kilgore had about a ten-fold increase during that time; Longview about four-fold; Gladewater about eight-fold, and Tyler more than doubled its population. Living in these and other East Texas cities and in field camps are nearly 2000 Humble employees, including more than 1000 in Production, 215 in Sales, 533 in Pipe Line operations and others in construction, exploration. and right-of-way work.

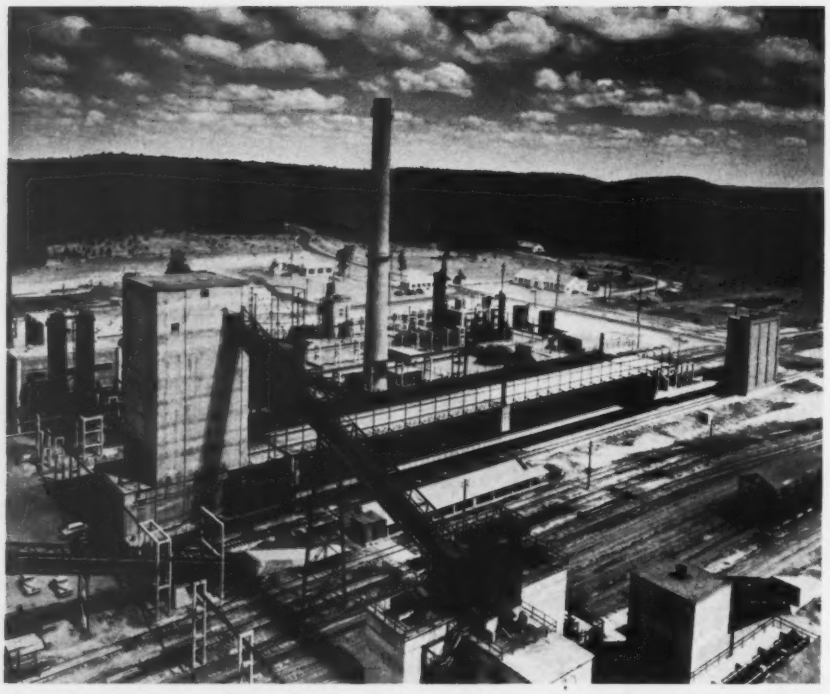
Humble's sales operations in northeast Texas have been greatly expanded since 1946. In August of that year, the first deliveries of Esso Extra were made through Humble Pipe Line Company's new products pipe line from Baytown to the Dallas-Fort Worth area, and since that time these deliveries have increased steadily.

New bulk plants have been built and placed in operation at McKinney, Clarksville, Sulphur Springs, Paris, Bonham, and Texarkana. Other new bulk plants have been established at Sherman, Gainesville, and Denton.

Fanning out from these new Humble bulk plants in an ever-widening circle are new Humble retail outlets. In effect. the new products pipe line has made it possible for Humble to deliver economically to northeast Texas motorists the high quality products that are made at the great Baytown refinery. The pipe line, that most efficient mode of land transportation for oil, has brought Baytown refinery literally to northeast Texans' front doors.

Forestry and Lumbering

While this article deals chiefly with East Texas oil, other industries have also made heavy contributions to the wealth and well-being of East Texans. The "East Texas Pine Belt" covers 18,655,000 acres in 36 counties. Reforestation and wise use of this great belt of timberland has been such that, according to the latest *Texas Almanac*, there has been only a three per cent over-all reduction in timber there during the last 10 years in spite of the fact that, in an



STEEL PLANT at Lone Star, just a few miles out of Daingerfield. The plant, which mines its ore from nearby hills and prepares that ore for the blast furnace, began producing pig iron in 1947. Oklahoma mines furnish the coal, and plant ovens make 33,000 tons of coke every month.

average year, aproximately 1,750,000,000 board feet of timber are cut. Products made from this timber include lumber, pulpwood, veneer, cooperage and staves, railroad ties, poles, fuelwood, and the like. The value of these products runs very close to $100 million a year. The value of remanufactured forest products (woodpulp products, furniture, toys, etc.) is close to $35 million a year.

To conserve this vast timberland, a total of 5,266,400 pine and hardwood seedlings were planted during 1943-46, and total timber resources in East Texas are now estimated to be about 27½ billion board feet with a value of more than $275 billion. There are about 550 sawmills operating in the area.

An interesting and important corollary with East Texas lumbering is the recent growth and development of the paper industry in that region. A newsprint paper mill, built at Lufkin in 1939, was the first mill to make newsprint from Southern pine. This mill went into production in 1940 and enlarged and expanded its operations in 1942.

Wood from East Texas is being shipped to paper mills completed within recent years on the Texas Gulf Coast, notably at Orange and Houston, where it is converted into newsprint and magazine paper.

The iron and steel industry is not entirely new to East Texas, although it has come in for most attention there since World War II. Deposits of iron ore in the area had led to the establishment of several foundries as far back as pre-Civil War days, but these soon found themselves at a disadvantage. There was not enough of the right kind of coal available to make coke, and freight rates to steel-consuming markets were adverse, so the early East Texas steel ventures failed and the industry had to close its doors there.

World War II Revives Industry

World War II and its heavy demands for iron and steel brought the industry back to East Texas in some force. A $35,000,000 plant, complete with blast furnace, coke ovens, and everything necessary to make high quality pig iron, was built at Lone Star, just a few miles out of Daingerfield.

The war was over before the plant had a chance to produce for the armed forces, and it was purchased by private capital from the War Assets Administration. The plant now uses the equivalent of two train loads of material daily, consisting of coal (from which the coke is made), iron ore, and limestone. More than 12,000 tons of raw ore—limonite and siderite from open pits in the nearby hills—is mined daily, and this is converted at a nearby beneficiation plant into about 3,000 tons a day of finished concentrated ore. The plant's blast furnace produces an average of 850 tons of pig iron per day, or 25,000 gross tons a month. Coal mines in Oklahoma furnish the necessary coal, and the coke ovens produce about 33,000 net tons of coke a month, all of which is used by the blast furnace. By-products of the coke ovens include ammonium sulphate, tar, toluol, benzol, and xylol.

Agriculture

East Texas can currently boast of more than new industry; it is experiencing an agricultural renaissance, too. Land that for years was "just plain one-cropped to death" is being brought back to life with fertilizer, legumes, crop rotation, terracing, and other scientific farming methods. Soil Improvement Councils in many counties are working wonders. Serving on these councils are all kinds of people who must pull together to get the best out of the land: farmers, bankers, merchants, teachers, and representatives of state and federal agricultural agencies.

The East Texas farmer, under the Soil Improvement Council set-up, is getting some real help. When he needs fertilizer or legumes, he knows they will be available at the feed store; when he needs technical help and information, he knows it will be forthcoming. As a result, the progressive East Texas farmer is improving his pastures, going in for soil conservation and diversified farming, taking up new crops where they will pay off, building up his herds, and taking better care of his land and livstock. All this adds up to a more prosperous agriculture and a better life for farmers.

Total value of crops harvested in East Texas in 1945 (last complete U. S. Department of Agriculture Census figures available) was $141,467,728, indicating that East Texas is still an agriculturally productive area. Most heartening of all is the fact that East Texas farmers no longer depend entirely on those two old standbys, corn and cotton, for their cash crops. The area around Jacksonville now produces thousands of carloads of tomatoes every season. The rose-growing business in Tyler and its environs long ago broke the million-dollar-a-year mark. Fruits and watermelons, as well as sweet potatoes, are shipped by the carload from East Texas to other parts of the state and beyond.

Taken all together, the bountiful products of the East Texas soil and the mineral wealth in and beneath that soil prove beyond any doubt that settlers of the 1800's chose better than they knew when they decided to make their homes in this land of green pines and red hills.

The High Cost of Staying in Business

It takes a lot of money to keep us in jobs

EVERYONE realizes the influence of the decline in the purchasing power of the dollar on the cost of living. Most of us are not aware, however, of the great change that has occurred in the investment required to provide jobs in the petroleum industry. In the Humble Company, for example, it now takes about $92,500 to provide the facilities back of the average Humble job, or approximately three times the investment that has been made in the past for the average job. In addition to the influence of inflation, the petroleum industry's replacement cost has increased because it is becoming more difficult and expensive to find oil. The combination of these factors has brought about great changes in the financial requirements of the petroleum industry in recent years. To indicate the significance of these changes, it is well to look at current replacement costs in terms of the capital required to provide an average job.

Average Humble Job $92,500 Now

Suppose that Humble were to start from scratch today to provide the properties, equipment, and capital being used at the beginning of 1948 by the 18,000 employees. It would be necessary to drill 9,000 oil and gas wells, to lay about 6,000 miles of large pipe lines and 3,000 miles of smaller gathering lines, to construct refineries with a capacity of 240,000 barrels daily, to acquire 27,000,000 barrels of crude oil and product stocks for the purpose of carrying on operations, to build or lease 320 bulk and service stations, and to own many other facilities such as drilling rigs, natural gasoline plants, office buildings, and research laboratories in order to carry on the operations of the Company. That means that back of the average job for one employee the Company has ½ well, 1/3 mile of main trunk line, 1/6 mile of gathering line, 13 barrels daily of refining capacity, 1,500 barrels of crude oil and products as working inventory, and such other items as drilling rigs, natural gasoline

EMPLOYEES ARE INTERESTED in Humble's finances; they want to know about the Company's income and its expenses. They are interested, too, in the number of wells drilled, new plants built, and the like; these facts are presented in the Company's annual report.

plants, office buildings, and working capital. The cost of those items amounts to $92,500.

The first reaction to such a calculation may be one of surprise that it takes so much money to provide the average job. The figure of $92,500 will seem especially large to office workers who cannot see such an investment back of their job. Employees in the field will realize, however, that the large investment in wells, refineries, and pipe lines runs the average up rapidly. In production operations especially, it takes much more than $100,000 to provide a job in areas of expensive drilling costs, such as West Texas where a single producing well alone may cost several hundred thousand dollars. Some modern refinery units require an investment of about $500,000 per employee engaged in their operation. It is capital expenditures such as these which account for the high average investment.

It takes plenty of money to provide the average job with Humble, and a great deal to keep us all in jobs and provide some expansion to keep pace with increasing demands. In 1947 Humble invested $96,000,000 in production, refining, pipe line, sales, and other facilities that are the basis of employment. In the last five years, 1943-47, Humble's investments in such facilities have been nearly $350,000,000! In 1948, if sufficient materials can be secured, the Company expects to invest about one hundred and forty million dollars in new facilities, or twice the average of the last five years. Where does all that money come from? In Humble's case, most of it comes from earnings retained in the business. Over the life of the Company, about 60 per cent of all the earnings has been plowed back into the business, compared with 40 per cent has been paid out to the stockholders in dividends. That money retained and invested in facilities has meant more and better jobs for Humble employees.

Higher Replacement Costs

The trend of replacement costs in the petroleum industry has been sharply upward in recent years. In Humble's 1947 Annual Report it was pointed out that the average cost per well completed in 1947 was nearly four times as much as the average cost of wells completed in 1937. Similarly, the cost of exploring for oil has increased several fold and the cost of lifting oil from underground to the surface has more than doubled. Refining equipment, pipe lines, service stations, and all other types of facilities show substantial increases. The net result of these various changes has been to triple the average investment required to provide a job with Humble since the period 1937-41.

The cost of replacing facilities is of immediate significance to both stockholders and employees as well as consumers of petroleum products. Each year the industry uses up about 5 per cent or more of its reserves and facilities and has to replace at least that much to maintain employment and the current level of supplies. Actually, with the rapid expansion that is taking place in the demand for petroleum, the industry finds it necessary to make even larger investments at the current high replacement costs. In order to encourage stockholders to maintain the facilities in the petroleum industry and to provide the funds for expansion, prices and net income must be such as to indicate the possibility of a reasonable return on the current high replacement costs. Otherwise, stockholders would prefer to take their money out of the petroleum industry as rapidly as possible with the result that the number of jobs would decrease and supplies of petroleum for consumers would be lessened.

Three factors must be taken into account in analyzing the earnings of the petroleum industry: (1) the decline in the value of the dollar, (2) the increase in the volume of products being supplied, and (3) the higher replacement costs due to the great difficulty and expense of finding oil as wells have to be drilled deeper. In the case of the Humble Company, for example, it may be noted that production in 1947 was nearly 2.5 times as much as in 1937 and that the volume of oil refined and transported showed an increase of 50-75 per cent. In view of these factors, earnings in the oil industry have to show a large increase over pre-war levels in order to provide a reasonable return and sufficient incentive for continued new investment.

The risk that stockholders run is that money may be lost on some of the current high investments in the next swing of the cycle, when it comes, and prices decline. All economic history shows a steady succession of "ups and downs" in prices, and the future may be expected to repeat that pattern. That is why the net income of corporations should be judged over a period of good and bad years. The apparently good returns in prosperous years help offset low income and bad-year losses.

Effect Of Higher Costs On Depreciation

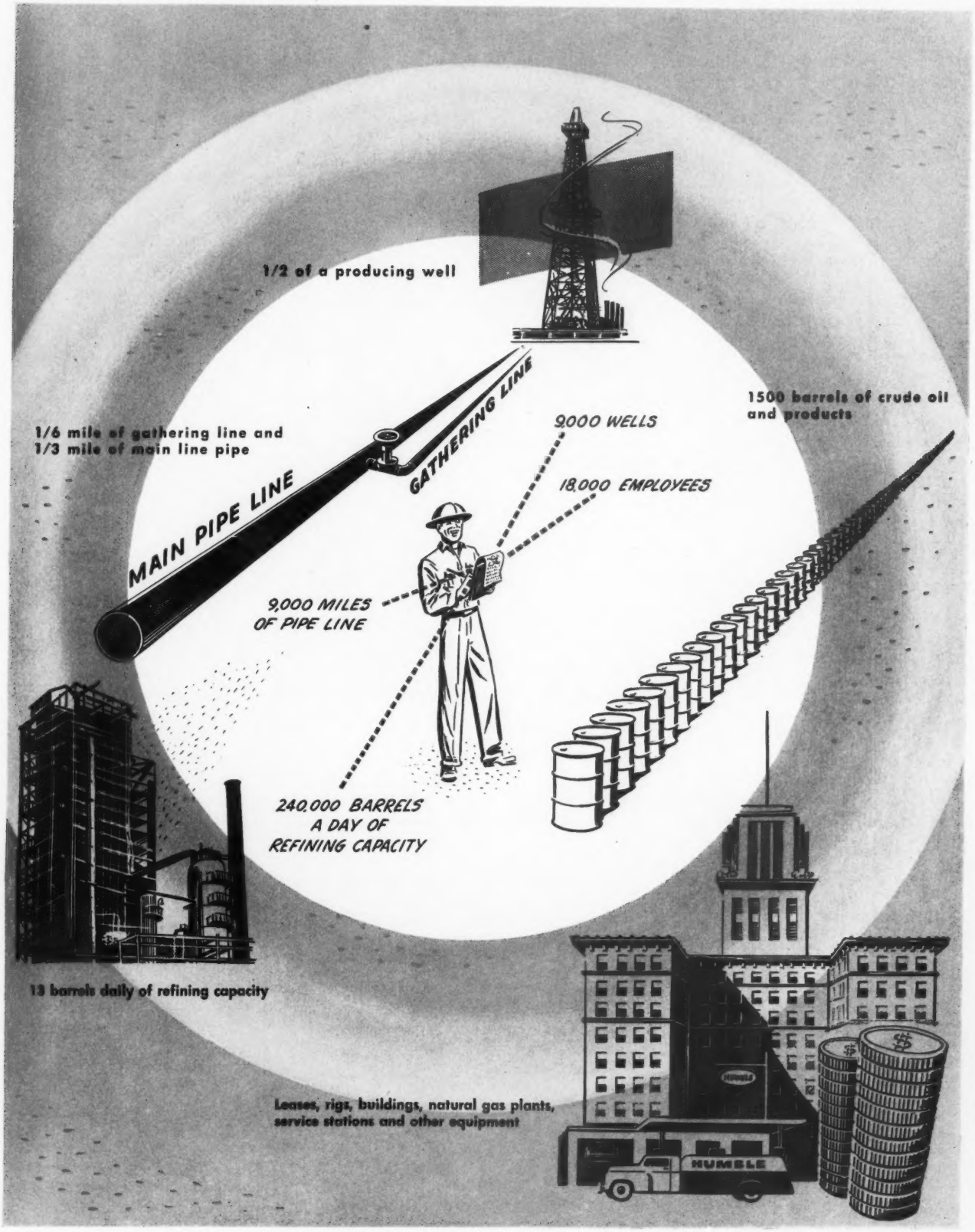
A number of corporations have taken into account in their reports to stockholders the difference between current replacement costs and past investment and have made additional charges against income to take care of such difference. These charges allow for the fact that the money normally set aside for depreciation on old facilities is not actually sufficient to replace such facilities at present prices. For the past several years Humble has studied with care the possible need for additional depreciation charges. It decided not to make such charges in 1946 and 1947, in order to maintain consistent accounting principles that had been applied over many years in preparing the Company's financial statements. It was clearly pointed out in the Annual Report, however, that if the present high replacement costs were taken into account, Humble's provisions for depreciation and depletion would have been larger and net income correspondingly lower. Determination of these provisions on the basis of replacement costs might have reduced net income by more than 25 per cent in 1947. If replacement costs continue to show an increase, the Company may find it necessary to take the changed situation into account in its financial reports.

Why New Investment Is Important

Knowledge by employees and stockholders about the investment required to provide an average job with Humble is basic to an understanding of the Company. The large capital investment and the unusual risk involved in petroleum operations are important factors in determining the size of the companies in the industry and have special significance as to the economic conditions required to promote satisfactory operation of this industry. While it is difficult to understand the complex modern economy in abstract, we can approach this problem through study of the operations of the Company and industry in which we have a direct interest because of employment and stock ownership.

The basis of more and better jobs for employees is continued investment in business, so all of us have a direct interest in seeing that economic conditions operate to bring about such investment.

What it Takes to Make a Job with Humble



DECAYING BULL WHEELS AND WOODEN DERRICK ARE SYMBOLIC OF THE PASSING OF THE STANDARD CABLE TOOL RIG.

They Still Drill with Cable Tools

Almost forgotten in some areas, cable tools drill nearly one-third of wells in the U. S.

ON THE floor of a small cable tool spudder on location in North Central Texas, the tool dresser was throwing bottles down the hole. "Throw in a few more," the driller said as he prepared to lower the string of tools in the hole to resume drilling.

This particular spudder, which will celebrate its twentieth birthday this year, was drilling out below the casing into the oil-producing strata at a depth of about 1,750 feet. A fast-moving portable rotary rig had preceded the spudder at this location. The rotary crew had drilled to just above the "pay" zone, cemented casing in the hole, and moved off. The first section to be drilled by the spudder was the 2-foot rubber plug pumped down with water to force the cement out the bottom of the casing.

That's where the bottles came in. Cable tool bits have a relatively dull cutting edge like a chisel, and would merely bounce off the rubber with no progress. Unlike the old time driller who, legend says, bounced the tools clear out of the hole while drilling a "vein of rubber," the spudder crew tossed in bottles which soon made enough broken glass to cut up the rubber as the drilling bit pounded away.

This simple expedient is rather typical of cable tool drilling, and is in sharp contrast with the highly-developed techniques used today on large rotary rigs. Oil field ingenuity, however, plays an important part in drilling for oil, whether with rotary or cable tools.

Rotary tool advocates may look down on the pioneer cable tool method of drilling as inefficient and out-of-

date. Indeed it is in many, many cases; yet, approximately one of every three wells drilled in the United States uses this simple method of lifting the chisel-shaped bit and tools and dropping them again and again to grind up the rock. During the first half of 1948, 5,001 wells were drilled with cable tools, 28 percent of all the wells drilled in the United States in that period. That does not include wells drilled with rotary and finished with cable tools, but only "big holes" drilled exclusively with cable tools.

Most "standard tool" activity is near the oil industry's birthplace in Pennsylvania and neighboring states. Cable tools are widely used, however, in East, North, and West Texas, and on into Kansas, where they are used mostly for "tailing in," or finishing wells drilled almost to completion with faster rotary rigs. The numerous small, shallow, low pressure oil and gas reservoirs located below hard formations in that region are particularly suitable for cable tools.

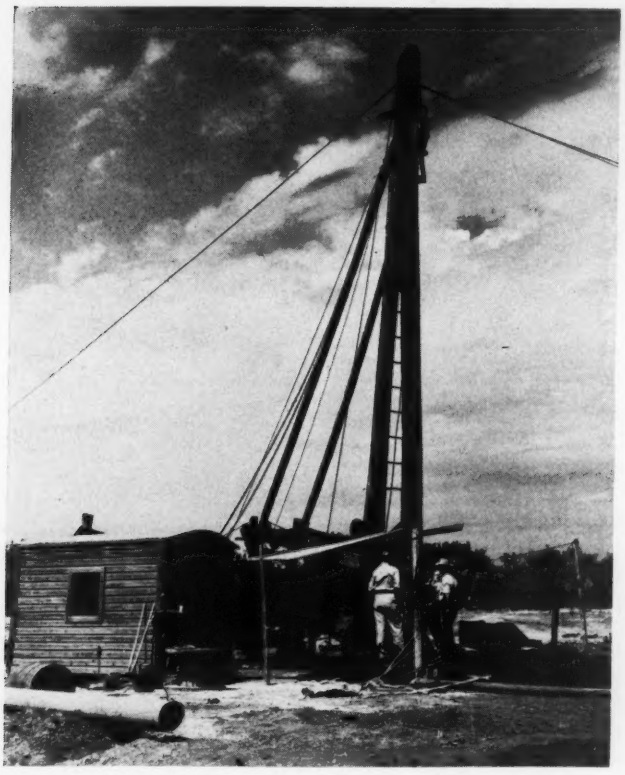
Cable tools are used to advantage where cavities and very porous formations absorb rotary drilling mud and prevent its return to the surface. "Lost returns" is the common term for this lost circulation which has caused abandonment of many rotary-drilled holes. In many low-pressure reservoirs rotary drilling mud will penetrate or clog the producing formation and seal it off, making it impossible or extremely difficult to bring in a well. Currently most wells in these areas are drilled by rotary rigs and casing is set in the hard rock formation immediately above the "pay" zone. The wells are then drilled in with cable tools.

Thus, the features of rotary drilling which have made it possible to drill nearly four miles down and to overcome heaving formations and high pressures prevent successful rotary completions in some areas. The weight of the column of mud in the hole which controls high subsurface pressures, and the caking action of the mud which seals the walls of the hole work to disadvantage when drilling into shallow low-pressure reservoirs. Sometimes formations so sealed escape detection even by electric logs.

Cable tool drillers keep only a few feet of water in the hole to cause shale formations to make mud and drill easier or to make mud which will suspend rock cuttings when drilling harder formations. In this way, there is practically no pressure on the strata being drilled through, permitting any entrapped fluids to pour into the hole. Very small oil shows that would be missed by rotary drilling are sometimes evident in the mud and cuttings picked up by the cable tool bailer, a long bucket with a valve in the bottom. The bailer is run to clean out the hole and remove cuttings at frequent intervals.

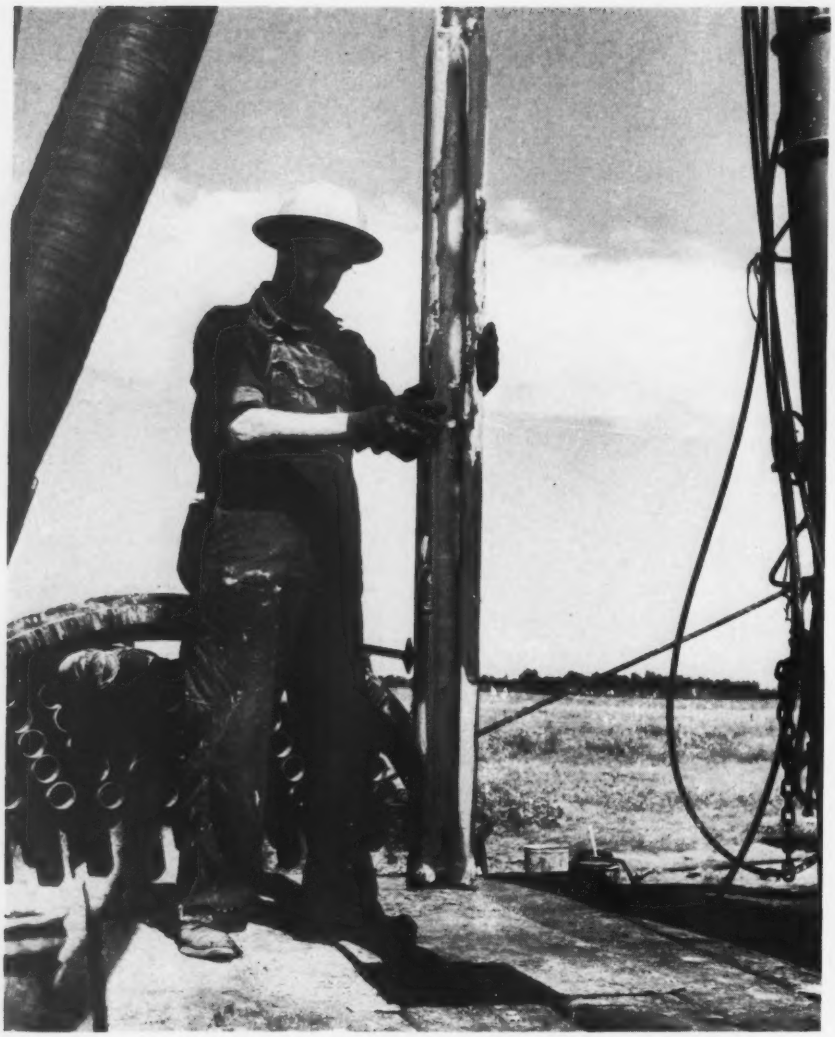
Since cable tools require little or no fluid at the bottom, they see much use where underground caverns and very porous formations are found. Some West Texas and New Mexico areas are difficult to drill with rotary because the "redbed" formations slough when wet. Cable tools are often used to drill through these zones, which are then cased off and the hole completed by the rotary method.

The rhythmic thump-thump of the tools rising and falling is music to a cable tool man's ears just as the hum of the rotary table is to the "swivel neck," as old time "rope chokers" refer to rotary drillers. Cable tool drillers were called rope chokers in earlier days because they fed the drilling line through a restriction or clamp. The



WICHITA FALLS Spudders, one of the pioneer "drilling machines," are still used today for drilling shallow holes in North Texas.

NEWER-TYPE spudders in use today are preferred for strength and versatility; Humble's Rig 25 has a small rotary attachment.



TOOL DRESSER Rufus Brown on Rig 25 guides the bit into the hole before drilling is resumed. Cable tool bits have a dull chisel-shaped edge and mud channel up the side.

DRILLER Henry Miller drops in hunks of shale to make mud when drilling hard rock.

skill lies in the ability to get just the right amount of snap to make the bit hit bottom and rebound with the stretch of the drilling line, like popping the whip.

The "string of tools" on the end of the cable tool drilling line consists of the bit, drill stem for weight and keeping the hole straighter, jars to jar the bit loose if it sticks, and the rope socket for attachment to the wire drilling line. Prior to the development of the swivel socket soon after the turn of the century, all cable tools rigs used manila rope for drilling. The weight of the string varies from 1,500 pounds to 5,000 pounds, depending upon the size and depth of the hole. Cable tools aren't often used below 6,000 feet, due to the difficulty of checking the bit closely and in obtaining a rapid snap of the tools at the end of the long cable.

Cable tool drilling requires the setting of more strings of casing than does the rotary method. Each water flow encountered pours into the hole, and can be stopped only by setting a string of casing to shut off the flow. Several strings of casing are thus required to shut off the many water sands. Usually, only the oil string, through which the oil or gas is produced, and the string which protects the upper part of the hole are left in the ground after the well is completed.

No doubt the extreme of such a situation lies in the tall tale of a legendary driller in West Texas. No one had been able to successfully put down a well in a certain area and he was finally sought out to drill a well. Told to "hang the cost, get the well," the driller headed for West Texas with several trainloads of equipment. He had a tremendous derrick built and spudded in. At the first water sand he set casing made of welded 10,000 barrel tanks (diameter approximately 55 feet.) Since each casing string is set inside that already in the hole, 7,500 barrel tanks were used next. Ten more sands and ten strings later, he was setting 20-inch casing, which was the largest normally used in drilling. Drilling continued through more sands, and soon he was drilling through one-inch tubing. Undaunted, he continued until at long last the well was drilled in with a needle and thread!

The wooden derrick and attached belt and engine house, popularly called the "standard rig," is fast joining the ranks of vanishing Americans. Once the trademark of oil fields everywhere, the oldtimer gave way to portable spudders almost a generation ago. The few remaining wooden derricks bear the scars of many bouts with the weather.

Spudders, popularly called "drilling machines" since their inception, came into prominence about the time of the first World War as the internal combustion engine became more versatile. Today they perform practically all cable tool drilling. Spudders are compact and highly portable, saving much time and expense in building a derrick and rigging it up.

The wooden standard rig carries with it into obscurity many colorful terms of a growing industry. Mention of the "bull wheel," on which the drilling line was reeled, the "calf wheel" for raising and lowering casing, and the sand

reel for handling the bailer revives many memories. The "bull ropes" turned the "bull wheel," and the "walking beam" raised and dropped the tools in the hole while drilling. The "sampson post" was a sturdy 18 x 18 timber which supported the fulcrum of the walking beam. The safety post beneath the walking beam to protect the driller was called the "headache post."

Many cable tool terms remain today, among them the popular terms for wells. A "duster" is still a dry hole, and a "blue whistler" is a gas well, from the color and roar of an open gas well. "Gushers" have been gone for many years, yet the term remains as a description of old time spectacular displays of oil spraying over the top of the derrick. "Christmas tree" still means the assembly of valves at the head of a flowing well.

Cable tool drilling had its birth with the ancient Chinese who very ingeniously used a spring pole and crude tools to drill brine wells. The same method and principle was used in the early nineteenth century in West Virginia and Kentucky by men also drilling for salt water. These men devised a means of using a steam engine for power, and did away with the "jigging down" method of lifting the tools, similar to the treadle action of a sewing machine.

On several occasions in that region, oil gushed from the ground and the wells were abandoned in disgust. Salt-making by evaporating the brine from wells was a profitable business in the early 1800s, and the drillers had little use for the "worthless" petroleum other than to grease their wagon axles.

A salt-water driller made his own string of tools and drilled Col. Edwin Drake's well in 1859, historic as the birth of the oil industry. It was the first commercial oil well drilled for that purpose, and reliable reports place its production at less than 20 barrels daily.

Cable tools drilled the field of Pennsylvania, Ohio, and West Virginia, and a dozen other states during the latter part of the nineteenth century, when the "standard rig" configuration became established. The same method was used for drilling the water well at Corsicana, Texas, in 1894, which surprised everyone and brought commercial oil production to Texas. During the boom which followed, two North Dakotans brought in a horse-powered rotary method of drilling. They, too, had been in the water well business, and used a windmill to pump water down into the hole. Refinements were built into the rotary system, and it came into general use around Corsicana.

Much has been written of the gigantic oil discovery of Col. Anthony Lucas on Spindletop hill near Beaumont on January 10, 1901. There can be no doubt of its tremendous impact on the oil industry and, indeed, on our way of life. This was America's first great oil well, its daily production many times that of any well prior to that time. It proved the value of rotary equipment for drilling in soft formations, for cable tools had several times failed to penetrate the quicksands there.

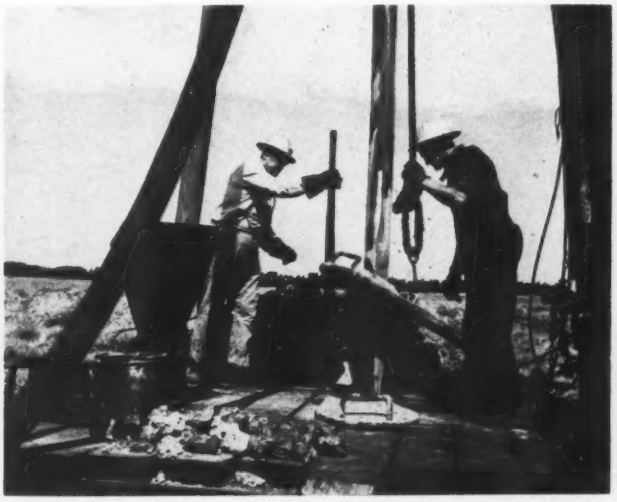
Rotary drilling quickly spread in the coastal areas, as the Spindletop well had also shown that oil often occurred around salt domes. Cable tools continued to reign exclusively where very hard formations had to be penetrated until the development of the rock bit in the 'teens and early twenties. This, with the refinement of the fishtail bit, made rotary drilling faster in all formations. During this period competition between advocates of each method was fierce, and rotary and cable tool men walked on opposite sides of the streets. The brand of tobacco carried (Mail Pouch for cable tools, Beech-Nut for rotary) denoted a man's drilling preference.

Precision techniques and equipment of today's large rotary rigs have made it possible to drill nearly four miles into the earth in the search for new and deeper oil fields.

Rotary drilling is much faster and more exact than the cable tool method, yet several factors sometimes outweigh these tremendous advantages. In addition to those reasons mentioned previously where advantages of the rotary method become disadvantages in some areas, the economy of cable tools often favors their use. The small crew (two men against three or more for a rotary) and ease of moving a spudder often tip the balance to cable tools for very shallow depths. Indicative of this is the fact that although many rotary rigs are manufactured in Pennsylvania, drilling in that area is almost entirely with cable tools.

Many oil men feel that development of cable tool drilling and equipment has fallen far behind in the swing to rotary drilling. Perhaps some of that lag may be taken up as cable tools are used more and more to drill new wells in areas where field pressures are very low.

"ROPE CHOKER" and "toolie" dress a bit; a red-hot bit is sledge-hammered into proper dress (shape) before final hardening.



DRILLER and tool dresser use ratchet jack on semi-circular track to apply squeeze on tongs when unscrewing cable tool joints.

By the way . .

Oil Progress Day, October 14

Humble Oil & Refining Company joined with the 34,000 oil companies all over the United States in observing Oil Progress Week, October 11-16, and Oil Progress Day, October 14.

Among Humble people who made speeches during Oil Progress Week were President Hines H. Baker, whose address to the Houston Rotary Club is printed in this issue of THE HUMBLE WAY; and Director Morgan J. Davis, who spoke before the Galveston Rotary Club. In addition, many employees in cities and towns all over the state served on local Oil Progress Day committees, planning programs, speeches, and other Oil Progress ceremonies for schools, clubs, and various civic groups.

At Baytown Refinery, special tours of the plant were conducted during the week for the public.

Humble service stations also participated in informing the public of the industry's progress, distributing some 40,000 Oil Progress Day pamphlets to their customers. Pamphlets were also distributed from Humble's exhibit booth at the State Fair of Texas.

They Have Retired

Eleven employees of the Humble Companies have retired since the last report was made in these columns. Six of the group have long years of service behind them in the Pipe Line Company; three were employed in Production; and two were employed at Baytown refinery.

In the Pipe Line group, EDWIN WILLIAM WALKER, engineer at the Webster station, retired on October 23 after 27 years of service . . . GEORGE AARON SAWYER, pumper at Talco and other pipe line stations, retired on September 24 after 20 years of service . . . MALTIE CLAYTON COKER, pipe liner who spent most of his time at Webster station, retired on August 1 after 21 years of service . . . JAMES EDWARD JONES, oiler at the Ballinger station, retired on September 10 after 22 years of service . . . WILLIAM EDGAR JONES, telegraph operator at East Texas pipe line stations, retired on September 27 after 17 years of service . . . and JASPER NEWTON TAYLOR, field engineer at East Texas stations, retired on August 13 after 22 years of service.

In the Production group, CHARLES ARCHIBALD COUCH, pumper HD in the Vernon and Holliday districts, retired on August 13 after 23 years of service . . . JAMES OLIVER CAPEHEART, pumper HD in various districts in the Gulf Coast and East Texas divisions, retired on August 25 after 20 years of service . . . and JOHN BAKER BLACKWELL, roustabout in the North Texas division, retired on October 6 after 23 years of service.

The two Baytown refinery men who have retired are ROBERT TOWNLEY MANN, utility man, who retired on August 27 after 20 years of service, and SHADRACK ARTHUR MCCLAIN, valve repairman, who retired on September 25 after 23 years of service.

Deaths

Seven active employees and four Humble annuitants have died since the last account of deaths was made in the preceding issue.

WILLIAM JAMES AUBERTIN, 54, analysis clerk in Sales accounting, died on August 4 . . . CECIL LEWIS COMMINGS, 46, supervisor in the accounting department at Baytown refinery, on August 6 . . . FRANK MCKAY, 21, truck salesman at the Alvin bulk station, on September 21 . . . IZORA CREEKS, 37, laborer at Baytown refinery, on October 10 . . . GEORGE HERMAN JOHNSON, 56, car repairman 1st at Baytown refinery, on September 28 . . . JAMES EMRY RAINS, 55, lease pumper and gauger at Tomball, on September 2 . . . and HARRY CAROTHERS WIESS, 61, Chairman of the Board of Directors, on August 26.

The four annuitants who have died are WILLIAM FRANKLIN ASHWOOD, 72, a roustabout at Goose Creek before his retirement, who died on September 6 . . . THOMAS EDWARD BENSON, 44, a lease pumper and gauger at Anahuac before his retirement, who died on August 3 . . . JAMES LOUIS BRODIE, JR., 77, chief of police at Baytown refinery before his retirement, who died on July 24 . . . and WILLIAM CAMPBELL, 65, assistant district gauger at Odessa before his retirement, who died on July 29.

The HUMBLE WAY

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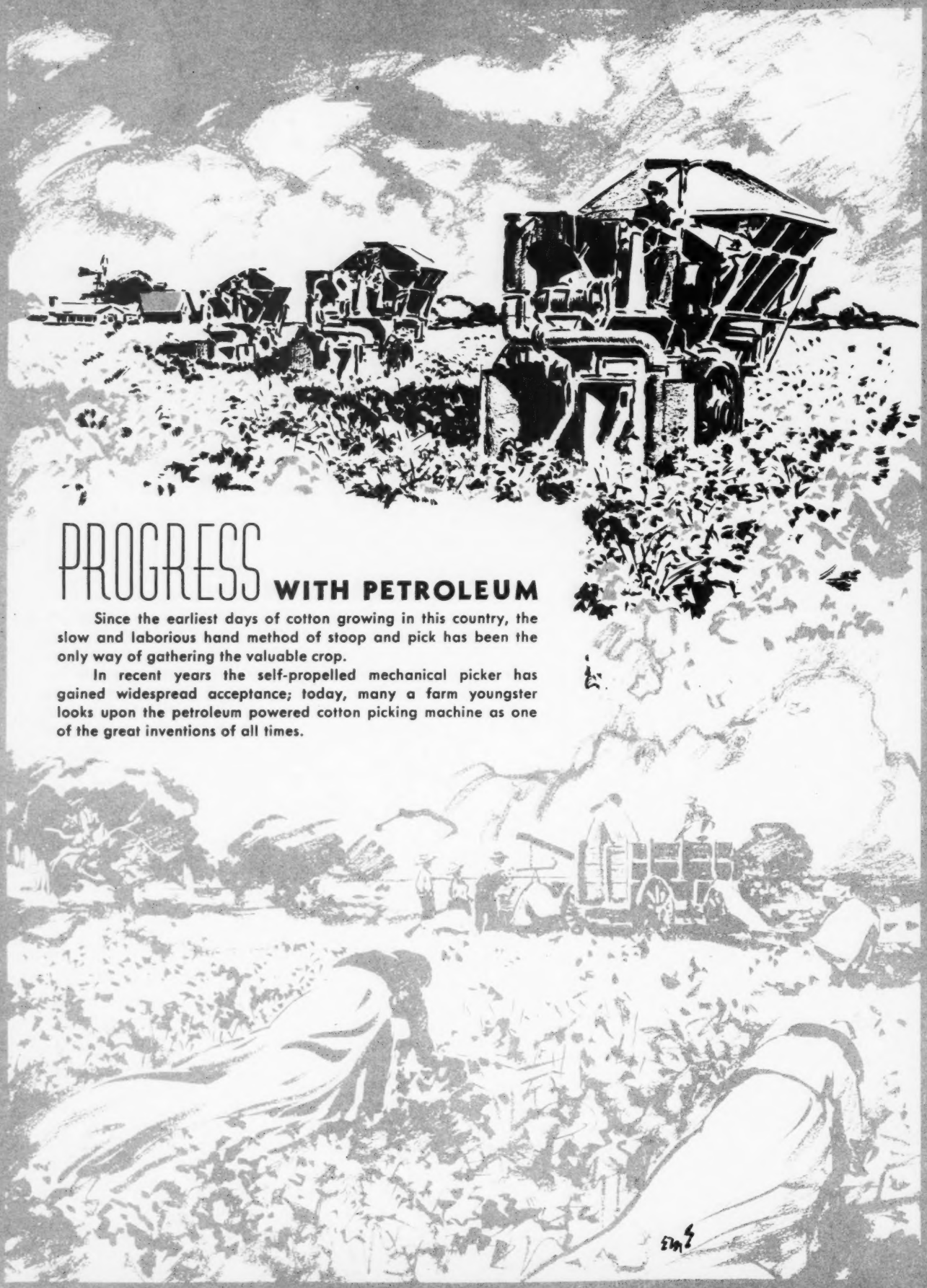
By feeling the drilling line as it rises and falls, the cable tool driller knows how the bit far below is digging. (See p. 24)

cable
. 24)



PROGRESS WITH PETROLEUM

Since the earliest days of cotton growing in this country, the slow and laborious hand method of stoop and pick has been the only way of gathering the valuable crop.

In recent years the self-propelled mechanical picker has gained widespread acceptance; today, many a farm youngster looks upon the petroleum powered cotton picking machine as one of the great inventions of all times.